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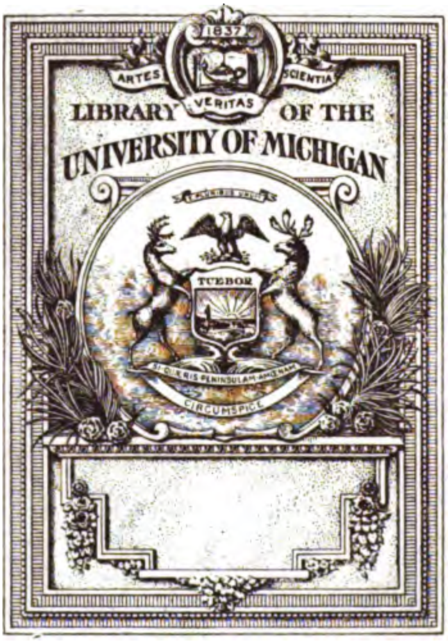
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EXHIBITING

A CONCISE VIEW

OF THE

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The Surgical Anatomy of the Arteries and Descriptive Anatomy of the Heart; together with the Physiology of the Circulation in Man and Inferior Animals. By Valentine Flood, A. M., M. D. T. C. D., M. R. I. A., &c. London, 1839. 12mo. Pp. 237.

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A Treatise on the Diseases of the Heart and Great Vessels, and on the Affections which may be mistaken for them; comprising the author's view of the Physiology of the Heart's Action and Sounds, &c. By J. Hope, M. D., F. R. S., &c. &c. Third Edition, corrected and greatly enlarged. London, 1839. 8vo. Pp. 639.

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An Account of some New Instruments for tying Polypi of the Uterus, Nose, and Ear, and enlarged Tonsils. By William Beaumont, Surgeon. London, 1839. 4to. Pp. 35.

A Treatise on Varicose Capillaries, as constituting the structure of Carcinoma of the Hepatic Ducts, and Developing the Law and Treatment of the Morbid Growths. With an account of a new Form of the Pus Globule. By Thomas Gordon Hake, M. D., late Physician to the Brighton Dispensary. London, 1839. 4to. Pp. 20.

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A Letter to the Right Honourable the Secretary at War on Sickness and Mortality in the West Indies; being a Review of Captain Tulloch's Statistical Report, by Sir Andrew Halliday, M. D., F. R. S. E. Deputy-Inspector General of Army Hospitals. London, 1839. 8vo. Pp. 63.

On the Objects and Mutual Relations of the Medical Sciences; an Introductory Address delivered at the Middlesex Hospital School of Medicine, October 2d, 1838, at the opening of the Winter Session. By Frederic S. Leighton, M. D. Lecturer on Forensic Medicine at the Middlesex Hospital School of Medicine. London, 1838. 8vo. Pp. 51.

A Short Treatise on Typhus Fever. By George Leith Roupell, M. D. Physician to St. Bartholomew's Hospital, &c. London, 1839. 8vo. Pp. 301.

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Lectures on Diseases of the Eye. By John Morgan, F. L. S. Surgeon to Guy's Hospital, &c. Illustrated by Coloured Plates. London, 1839. 8vo. Pp. 261. 18 Plates.

An Inquiry into the Propagation of Contagious Poisons by the Atmosphere; as also into the Nature and effects of Vitiated Air, its Forms and Sources, and other causes of Pestilence, with Directions for avoiding the Action of Contagion, and Observations on some means for promoting public Health. By S. Scott Alison, M. D. Tranent. Edinburgh, 1839. 12mo Pp. 219.

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An Experimental Inquiry into the Laws of the Vital Functions; with a View to remove the inconsistencies of our present Doctrines, and thus to establish more correct Principles respecting the Nature and Treatment of their Diseased states. By A. P. W. Philip, M. D., F. R. S., L. & E. Fellow of the Royal Colleges of Physicians of London and Edinburgh, &c. 4th Edition, greatly enlarged both in the Physiological and Practical Part. London, 1839. 8vo. Pp. 374.

A Treatise on the Medical Jurisprudence of Insanity by J. Ray, M. D. Edinburgh, 1839. 8vo. Pp. 326. Reprinted from the American Edition of 1838.

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Thoughts and Observations upon Pauperism, Poor Laws, Emigration, Medical Relief, and the Prevention of Crime. By William Fergusson, M.D. F. R. S. E. Inspector General of Army Hospitals. London, 1839. 8vo. Pp. 23.

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Essays on the most Important Diseases of Women. By Robert Ferguson, M. D., Fellow of the Royal College of Physicians, London, Professor of Obstetric Medicine, and Diseases of Women and Children, King's College, London. Part I. Puerperal Fever. London, 8vo. Pp. 299 and 36. 1839.

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1. JULY 1839.

PART I.

ORIGINAL COMMUNICATIONS.

ART. I.—*The result of Experience in Sea-Scurvy, with Remarks on its Prevention and Treatment.* By ANDREW HENDERSON, M.D., Fellow of the Royal College of Physicians, Edinburgh; Member of the Royal College of Surgeons, London; Surgeon, Royal Navy.

> ———"Quaeque ipse miserrima vidi,
> Et quorum pars magna fui."———

Introduction.—I CANNOT say that I have been induced to this undertaking so much by the solicitation of my friends as by a deep sense of duty which I owe to a class of men whose welfare has ever been near my heart, and among whom I have passed by far the best part of my days. Although the disease treated of in the following pages is far from being common in the present day in Her Majesty's fleet, yet, when it is considered that that fleet has hitherto derived its life-spring from the mercantile navy of this vast empire, it will not be thought a matter of small moment to endeavour to improve the habits, and extend the comforts of merchant seamen, as well as to urge upon those individuals intrusted with their management, the necessity of looking carefully to the victualling, clothing, cleaning of the person, and berths of the men who put themselves under their command, during long and often unusually protracted voyages, when almost every thing at present depends upon the judicious arrangements of the masters of merchant ships.

This object might, in a great measure, have been attained, had Sir James Graham, when he framed his bill to consolidate the laws relating to seamen, passed session 1835, (5 and 6 William IV. c. 19,) inserted one clause regarding the victualling of merchant ships, referring to a schedule of diet (which every seaman could insist on being provided for him,) in one line, and substitutes for such articles as cannot easily be obtained in foreign ports, immediately under the first line; and in another clause directed that warm clothing, blankets, and flannels be taken to sea in all ships, in order that they may be issued to the seamen when circumstances of climate and weather require them. One-half of the misery and ill conduct of the sailors in merchant ships at present arises from a want of such legislative interference. Every master or owner prescribes a mode of victualling peculiar to himself, and often highly injurious; most frequently by far too much animal food is allowed; bad bread and no cocoa, tea, or coffee, and perhaps too much spirits, and that issued unmixed with water. My brethren will surely think it no arrogance in me to direct attention to the subject, in the hope that the labour, which exemption from effective service has enabled me to bestow upon it may prove beneficial; when I tell them that I have occupied a tolerably wide field for observation, for upwards of nine years past, during which time I have performed seven voyages in charge of male convict ships to Van Diemen's Land and New South Wales. Some particulars of each voyage, as they occurred seriatim, I here prefix in a tabular form; and I may be permitted to state that, in that table, they have only a view of my outward voyages,—my homeward having also afforded me many satisfactory examples illustrative of the doctrine set forth in this short essay,—every line of which has been years ago recorded by me during the above period, either in the shape of letters to the late Navy Board, the Admiralty, or in journals which I have delivered into office.

TABLE showing the result of seven Voyages to Tasmania and New South Wales, in charge of male convicts, between 1st April 1829 and the 17th January 1838, viz.

Date of embarking prisoners.	Ports of embarkation.	No. embarked.	Date of sailing from	Date of arrival, port of destination.	Date of landing prisoners.	Number landed.	No. of deaths.		No. of days on passage.	No. of days on board.
							Sickness.	Accident.		
1–25 April 1829	Woolwich & Plymouth	72 120	11 May, Plymt. Sound	28 August, Hobart Town	8 September	192	0	0	110	160 136
3–4 August 1830	Sheerness	80 120	16 August, Downs	15 December Sydney	27 December	196	3	1*	122	146 145
21 April 1832	Portsmouth	186	7 May, Spithead	28 August, Hobart Town	3 September	185	1†	0	114	135
16 May 1833	Kingstown Harbour	220	4 June, Dublin Bay	20 October, Sydney	11 November	215	5‡	0	139	179
8–13 June 1835	Woolwich Sheerness	150 150	27 June, Downs	7 October, Hobart Town	14 October	299	0	1§	103	128 123
30 Aug. & 6 Septem. 10 September 1836	Kingstown Harbour Cove of Cork	118 73	13 September, Cove of Cork	5 January 1837, Sydney	18 January	190	1	0	115	140 130
24 August 1837	Sheerness	150	2 September, Downs	9 Jan. 1838, Hobart Town	17 January	150	0	0	129‖	146
					Total landed,	1427	10	2		
					Add died,	10	Less	than	¾ths	p. cent.
					killed,	2				
	Total.	1439				1439				

* Shot by a soldier. † Died from an over-dose of rum. ‡ Four died of scurvy.
§ Killed by a block falling upon his head from aloft. ‖ Three days at Teneriffe included.

As I have not taken the pen, buoyed up with the idea that I am capable of clearing up all points, I earnestly trust that the little I have attempted may be the means of drawing the attention of others, as opportunity may offer, in a more rational manner, than, it appears to me, has hitherto been done, to a subject not only of interest, but in point of humanity of the very first importance, whether we consider the past ravages of sea-scurvy, or its present less frequent, yet still occasional and most distressing occurrence in merchantmen. I have, in truth, seldom visited a port abroad for many years past, without either seeing instances of the disease prevailing to a great extent, or hearing of its doing so at a distance, chiefly among the ships employed in the sperm whale fishery, and merchant ships carrying cargo. So late as July last, I learned at St Helena, from Mr Armstrong, that the "Penelope" barque from Mauritius touched there a short time before, with her crew in a frightful state from scurvy, and the "Mellish" whaler was at the time in the roads recruiting her crew before she could venture to sail for England. My brother officers, especially those who have had charge of convict ships, will not for a moment suspect that I am reading them a lecture on our past inertness, as to the modes of prevention and methods of cure in scurvy. They will best gather my ideas on the subject from an attentive perusal of the whole, in connection with cases which they may have themselves observed, and from *post mortem* appearances. For my own part, I confess that I long took it for granted that the views handed down to us in the navy, from Sir Gilbert Blane and others, were incontrovertible, as I also believed for some time, (twenty-five years ago,) that almost every sore on the genital organs required a protracted course of some of the preparations of quicksilver to insure a cure, as well as that all subsequent or secondary symptoms were a proof that the specific had not been carried far enough,—a belief which I hope is long since renounced by every medical practitioner.

I may here notice, that I cannot allow any one to judge of lemon-juice, either as a prophylactic, juvantial, or lædential in scurvy, who has not put it upon a fair trial in his own presence, from day to day, which I have done in all weathers during the whole period of several of my voyages, standing upon the quarter deck, and mustering aft, mess after mess, seeing them drink the lemonade, which I had previously seen mixed, agreeably to the printed instructions on that head, viz. one ounce of lemon juice and one ounce of sugar, with a sufficient quantity of water to make half a-pint of lemonade, which quantity was served daily to every individual in the ship victualled by the government.

Nor can I permit a judgment to be passed on the use of the nitrate of potass as a remedy, unless I am assured that it has been fairly put to the test of experience in duly apportioned doses, as shall be hereafter noticed, unaided by lemon juice or any other acid; but not independent of due and unwearied attention to diet, clothing, dry cleaning of the ship, &c.* Should I have expressed myself strongly in support of my views and experience, and in disparagement of those who are no more, I plead no other excuse for having done so, than that it is my most anxious wish to bring the subject in question under the eye of the inquirer after truth, from whom I feel satisfied in my own breast that I have nothing to fear.

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* I admit that it is a bad principle in conducting any case to make a defence before any accusation is brought forward; but I wish to be done by, as I would myself do to others under similar circumstances.

I cannot close these prefatory remarks, without touching upon a point, on the due performance of which, health in other respects, and an entire exemption from scorbutic affections, in a great measure depends. This I do, convinced from experience while upon duty outward bound, and as a passenger on my homeward voyages in merchant ships;—that the commanders, either from carelessness on their part, or, as I have heard some of them express themselves, from a wish not to interfere with their people, (a sort of false delicacy which I cannot well comprehend,) allow their crews to go without shaving, or duly washing their persons, and but seldom changing their apparel, from the starting of the ship, to the termination of the voyage. Nothing, under such circumstances, can possibly keep men in health, unless it be the constant exercise, which the performance of their duty on board obliges them to take; for whenever we meet with an indolent, lazy, ill clothed fellow on board ship, so surely we have, in due time, a case of rheumatic scurvy. Then the cleaning of the part of the ship where the crew are accommodated is seldom punctually attended to. If it be cleaned, the usual manner of doing so is highly objectionable. A brush with a broom, and sprinkling and scrubbing, is the very mother of scurvy, rheumatism, and a thousand other ills. The sailors' berths should be scraped, or otherwise dry-cleaned regularly every day; the beds occasionally got up on deck to air in good weather; the men ought to be shaved, washed with soap and water, and clean clothes put on next the skin, at least once every week; and in cold changeable weather they ought to go warmly cothed; and flannel, as a general rule, ought to be worn by them at such times.

I shall afterwards have occasion to speak of diet as a preventive; but I may here notice, that the best manner of cooking salt meat is to boil it, after being well washed, and soaked in abundance of salt water, in a steep tub, for at least twelve hours before putting it into the boiler.

Few articles of their diet are more hurtful than the introduction of the skimmings of salt meat (slush) into their puddings. However well it may be washed and purified, it must contain a great deal of septic matter; at all events, it is very difficult of digestion, a sufficient reason for its discontinuance. For such trash, suet and raisins or currants are a proper substitute. Soap-boilers and candle-makers are the persons who know best how to make use of slush.

Scorbutic affections at sea.—Observation at sea has led me to distinguish two kinds of scurvy, which, for the sake of clearness, I shall designate by the appellations of *scorbutus*, or what is most generally described and known as sea-scurvy, and *purpura*, or that form of it which is called land-scurvy. But in making use of the term *purpura*, I beg it to be understood as applying to the disease herein described, and not with reference to some forms of *purpura* described by authors. Both, as I believe, depend upon a similar condition of the blood,—and both arise under similar circumstances as to weather, climate, &c., from a scarcity or pravity of food, or the abundant continuous use of food either in itself innutritious, or becoming so from the constant sameness of it; for it would seem that individuals will live and thrive on one kind of food for a time, but which their organs ultimately refuse to assimilate; the consequence of which is, that the blood not being furnished with the requisite matter to supply the daily wants of the system, the body becomes weaker and weaker, while the blood itself is found to be so attenuated, that it escapes from its proper channels into the cellular tissue near the surface, as in *scorbutus*, or into the cavities of the body, as is commonly seen in *purpura*.

Scorbutus is a disease occurring under every degree of latitude, from a high south or north to the equator; although I have observed it most prevalent on running quickly from the tropics far south or north, especially when the atmosphere has been moist for any length of time with blowing weather, and consequently the space between decks damp and ill ventilated, affecting the clothing, bedding, &c. of the people. It occurs most frequently in young men apparently strong and healthy, manifesting itself externally, chiefly on the lower extremities, in the shape of more or less extensive ecchymosis, at first of a very light reddish yellow tinge, often slightly raised above the surrounding surface,—sometimes, as I have ascertained, with increased heat, and in a few days gradually verging into deep black, in some few instances extending by degrees over the whole limb from the heel to the *nates*, accompanied with rigidity of the knee-joints, often attended with considerable swelling, not only of the knee but of the whole extremity, frequently without any complaint of pain, either on motion or pressure. Contraction of the joint seldom occurs where exercise and warmth are sufficiently attended to. The face in such cases seems fuller than usual, and of a doughy appearance. The gums often retain a healthy aspect, when the ecchymosis, swelling, &c. are considerable. Although it must be allowed that a spongy state of the gums often exists, yet I beg it to be understood that, it is not in the gums that the first symptom of scurvy is always to be looked for, as has been but two frequently inculcated. On the contrary, on examining men, I trust more to the general appearance of the countenance, the state of the tongue, which will in many instances be found swollen, whitish, flabby, and dentated, indicating, as I imagine, the depressed state of the mind, always present in scorbutic affections. I may here notice that I have seen many cases where the gums were not only spongy, but had vesicles filled with blood, ecchymosed, and sometimes entirely fallen away, leaving the teeth exposed down to the alveolar processes, on which subject authors have spoken much; but the statement of a horrid fœtor being perceptible, is one which my observation does not enable me to confirm, where the ordinary means of cleanliness are regularly had recourse to. From the pulse I have gathered extremely little, upon which any reliance can be placed. In the early stage of the disease, I have found it natural; in cases verging on the grave, varying extremely, but generally weak, easily compressed, fluttering, and sometimes intermitting. The surface is always dry, seldom smooth in this form of the disease,—frequently rugous or covered with small *papillae*, (*Cutis anserina*). I have not observed the temperature of the body generally increased, although, as I have already noticed, at the first onset, I have imagined the part affected with ecchymosis to be of higher temperature than the surrounding skin.

The bowels in such cases are generally slow, yet I have seen the reverse happen.

The circumstances under which I have been placed have prevented me from noticing the state of the urine particularly, not only from the frequent changes of the weather, temperature, &c. but from the want of convenience for ascertaining on a large scale the quantity daily passed, which must vary much under circumstances just noticed; but in the advanced stages of the disease, a greasy film appears on its surface, which I have even noticed on pouring it from a urinal into an open vessel.

Scurvy is always known to be present from the appearance of the blood drawn from a vein on cooling, should that operation have been deemed necessary to allay symptoms thought to depend on other causes; but I consider blood-letting as almost, if not altogether inadmissible in scurvy. In like manner, I have observed the preparations of mercury highly injurious, hastening the disease to a fatal close. Such patients as I have primarily treated by bleeding and calomel, in combination with powder of antimony, have assumed, as is not unfrequently the case, on the margin of the tropics, a pneumonic character, when small bleedings have been employed to relieve the uneasiness and oppression at the lower part of the chest,—a symptom of scurvy to be more particularly noticed when we come to speak of *purpura*, and the sense of sinking at the pit of the stomach.

The appearance of the blood on cooling resembles in some respects inflamed blood; but I think it has a stronger analogy to blood drawn from a weakly pregnant female. When the usual coagulation takes place the serum is copious and of a yellowish colour; the crassamentum is very dark-coloured, soft, easily broken up, rather convex than cupped on its surface, and covered with a very curiously variegated or streaked coriaceous coat of a greenish hue, not easily mistaken when once carefully observed. I have seen the blood cool without coagulating so, merely becoming like a thin jelly, having a firm film on its surface, with here and there a few drops of serum bursting from it. On handling it with the fingers it feels like water (*i. e.*) without tenacity, hence I infer that the fibrin must have in a great measure become altered in its quality, or entirely disappeared. But more of this anon.

Whether the patients present themselves to the surgeon to show any of the appearances above noticed, or the surgeon detects the person to be scorbutic before he is aware of it himself or not, on inquiry, it will be found he has not been able to eat his ration of provisions for some time past, and that he loathes some particular article which he has not tasted of late; he will tell you he vomits his food, or that it swells his belly, or that he seldom has an alvine evacuation, or that his strength has failed him without any apparent cause. These and other signs of dyspepsia may be easily detected by inquiry and observation.

It would be almost an endless task to enumerate all the symptoms which occasionally appear during the progress of this disease. Every medical man of tact will be able to account for their appearance, as well as to prescribe means for their relief. In general, I may notice, that, on a change in the weather from a dry to a moist state of the atmosphere, acting as a better conductor of caloric, (the patients feeling the cold more, although such cold may not be indicated by the thermometer,) all the symptoms and appearances are aggravated. An issue of spare blankets and flannels at such times adds much to the comfort of the sufferers, and otherwise affords great relief. The introduction of a stove, too, into the sick berth, is a matter of no small moment. Irregularities in diet occasionally may be looked to, as accounting for symptoms which might not have shown themselves, had the patient attended more carefully to the recommendations given by his medical adviser.

Purpura.—I have said that *scorbutus* most commonly makes its appearance among the more healthy, after a continuance of moist, cold, and often stormy weather. *Purpura* in like manner is found to prevail most under similar circumstances, among those of a feeble constitution; chiefly those who are recovering from other diseases, or who have lately gone to their usual employments, but have not regained their wonted strength. Hence in long voyages, it is highly necessary to have an eye to the weakly, and to persons who have been on the sick list for any serious complaint, even from the first starting of the ship on her voyage. In them, in place of the countenance being puffed up, it appears shrunken, sallow, of a cadaverous aspect, and accompanied by an expression of anxiety, I think, peculiar to this form of the disease. The body and limbs are wasted, the muscles soft and flabby, often attended with œdema of the ankles towards night. If the skin be at all discoloured, it is not the extended blotch that we see in *scorbutus*, but small specks or petechiæ at first on the lower limbs, gradually extending to other parts, especially to the back, from the shoulders down. These I have seen so strewed over the whole body and limbs, and ultimately becoming larger and of different forms, in size from that of a pea to that of a half-crown, so that the poor sufferer comes to resemble a human skeleton covered with a leopard's skin, the flesh and fat having nearly vanished. In the case just alluded to, complete blindness occurred some weeks before death, without any visible film or milkiness of the eyes, which in that instance took place just as the anchor was let go in Port Jackson, after a passage from Dublin Bay of 139 days; and I have seen permanent amaurosis occur in such a habit, and no petechiæ appear at all. This patient regained his general health, but not the use of his eyes. In others the petechiæ continue much the same as they at first appear, while the œdema extends up the legs, stiffening the knee-joints in its passage to the body.

Here again the gums are not always spongy, bleeding, ecchymosed, or falling from the teeth, but they are oftener so affected in this form of the disease than they are in *scorbutus*. In one case of a weakly scrofulous lad, who had been on the sick list from the sailing of the ship with extensive disease and ulceration of the glands of the neck, the gums entirely fell from the teeth, the lower extremities became stiff and œdematous to the groin, covered with small petechiæ, and there was an irregular state of the bowels. Yet this boy continued to walk about, holding on by the bed boards below, or a rope upon deck in fine weather, was landed at Sydney, and recovered.

Cough is almost a constant attendant on this affection, with considerable watery expectoration. But that which marks its presence most satisfactorily in absence of the petechiæ, is a sinking, almost invariably complained of at the præcordia—a sort of death-like feeling, (short of pain,) as I have heard patients describe it, and which adds greatly to, indeed is the chief cause of, their distress, and would seem to create the anxious look spoken of. Diarrhœa or dysentery is often present, of a most unmanageable character, rapidly draining away the last dregs of what at best may be called a worn-out habit of body. I have seen one case of this sort terminate fatally in five days from the time it came under treatment. But the man acknowledged having suffered from dysentery at Cork sometime before his conviction. This was the only way in which I could account for the extensive ulceration which had taken place throughout the whole length of the colon, and even some such ulcers were visible in the small intestines. So much was this the case, that I remarked in my journal that, of the many bodies I had examined who died of dysentery contracted between the tropics, I never saw one more completely ulcerated than the one alluded to. The peculiarity of this species of dysentery is, that fever is never present, the tormina and tenesmus are not so urgent as in the dysentery of warm latitudes, arising from other causes, nor is vomiting so frequent.

As in *scorbutus*, little information is to be gathered from the pulse, except as indicative of the remaining strength of the individual.

Causes.—The causes which chiefly contribute to produce scorbutic affections among convicts, soldiers, and sailors in merchant ships are,

First, The depressing passions; hence convicts are probably more liable *cæteris paribus* to be attacked with scurvy than men who bear the stamp of freedom; idleness, filthy habits, a vitiated habit of body, whether congenital or acquired,—seem in an eminent degree to predispose persons living for a length of time on a diet which the digestive organs become unable to assimilate.

Second, A continuous moist state of the atmosphere, damp unwholesome quarters, cold and insufficient clothing, excite the disease in persons already predisposed to it.

The disease itself, (or its proximate cause,) would seem to be an attenuated state of the blood, arising from want of a sufficient quantity of nutritive matter carried into it from the digestive organs, properly so called.

The existence of the first of these causes I infer from the previous state of patients who readily become affected with scurvy.

The second, from situations at sea in circumstances of weather, where I have often been present, and where the disease prevailed most.

The appearance of the blood drawn from a vein shows that it is attenuated, having lost the elective effect of its fibrin, in not collecting the red particles in the usual manner on cooling; and that the red particles themselves are altered, broken up, or dissolved. The ecchymosis of the cellular tissue, so frequently manifested near the surface, the escape of blood into the intestines, into the cavities of the body, and from surfaces thickened by previous inflammation, as well as from ecchymosed spots on internal organs, all go to prove that the blood has lost its healthy consistency and tenacity.

I examined the body of a convict who died from what I have named *purpura.* He had, when at liberty, suffered frequently from inflammation within the chest; and, as he stated, had been repeatedly blooded for that disease; indeed that seemed alone to be his complaint, when placed upon the sick list; and he was convalescent, when *purpura* made its appearance in the shape of petechiæ, spongy gums, sinking and oppression at the pit of the stomach, &c. His bowels were in an irregular state, being sometimes purged, at other times constipated.

On examining the chest, the following appearances were noticed.

Fully two quarts of blood in a peculiarly attenuated state were effused into the left cavity, which would appear to have been poured out by the vessels of the *pleura costalis*, which was in a thickened and softened state; the lung was compressed into a small space at the upper part of the chest; the right lung adhered firmly to the surrounding parts, was very dark-coloured, of a firm consistence. The *pericardium* contained an unusual quantity of fluid. There was a small quantity of serum in the abdomen. The liver was of natural size and appearance, the under surface quite softened; the cellular substance surrounding the *recti* muscles was quite ecchymosed. The lower parts of the body were much discoloured.

Another equally complicated case of the same disease, in which the patient had laboured under symptoms of inflammation of the liver, &c. in consequence of external injury at a former period of his life, exhibited the following appearances.

The body was much emaciated; the legs covered with petechiæ; the abdomen was filled with bloody serum; the peritoneum and omentum were very much thickened, and bearing marks of chronic inflammation; the liver of a blue colour, hard, shrivelled, and tuberculated on its surface; the spleen of the same appearance, soft, and tuberculated; the left cavity of the chest was full of bloody serum; the lung quite gone, except two portions the size of the finger, and very much of that shape; the right lung was tuberculated, adhering, and almost black.

A case of scorbutus in a stout man of fair complexion and irritable temper with extensive ecchymosis of the lower extremities; swelling, rigidity, and pain of the knee-joints; gums perfectly sound and natural; was apparently recovering under the best diet I had it in my power to give him, aided by what I at the time (1833), thought of advantage, namely, a solution of nitrate of potass in vinegar and lemon-juice, as recommended by Mr D. Paterson in his Treatise on Scurvy, published at Edinburgh in 1795, which he called *Acetum Nitrosum*, and which was found useful by Mr C. Cameron, as reported in his letter to the Commissioners for victualling, in cases of *purpura* among convicts in 1829. The patient was seized with cough in the middle of the night; he afterwards vomited and was purged. I found him in the morning in a sinking moribund state; with the pulse feeble, fluttering, and irregular, with a cold perspiration all over his body. Small quantities of negus were given to him, and he rallied very considerably. He raised himself in bed about two o'clock to speak to a messmate, and suddenly expired.

Two hours after death, the body presented the following appearances. Except being very pale, it was that of a person who had died in good health, the ecchymosis which had existed on the limbs having disappeared. The abdominal viscera seemed sound. The omentum was loaded with fat. The liver was of the usual size and colour, but so soft, that it could scarcely be touched with the finger at several points, without penetrating into its substance; the left side of the thorax was completely filled with dark-coloured attenuated blood, the lung being compressed into the smallest possible space. On removing the blood, which must have flowed at several different times, from its being contained in at least three different cysts, formed by a thin layer of coagulum, not more easily ruptured than was the liver, and distending the lung with air, it was easily seen that there had been three ecchymosed spots, not larger than sixpence each, on the convex surface of the lung, two of which spots had given way. Air thrown into a large branch of the pulmonary artery escaped readily at these openings with a hissing noise, producing blood air-bubbles. Both lungs in other respects were perfectly sound and free from adhesions. The heart was bloodless, and unusually fat; the blood in the vessels quite fluid, of a dark colour, and without tenacity.

Means of preventing Scorbutic Affections in long voyages.—I have already noticed the regularity with which I have seen lemon-juice issued to prisoners, soldiers of the guards over convicts and their wives, during passages from England and Ireland to Hobart Town in Tasmania, and Port Jackson in New South Wales, as a preventive of scurvy, and have witnessed it fail so completely in numerous instances, as entirely to shake my belief of its ever having exerted such an effect in any case.

I have seen soldiers and their wives (out of a guard of thirty) badly affected with it, when I had only a few slight cases among 300 prisoners, and none among the ship's crew, who had no lemon-juice whatever allowed to them. I have given it in as great quantity as the stomach could well bear, as a remedy, aided by the best diet I had to give, and never saw it stop the progress of, or cure a single case. I have given it in conjunction with vinegar and nitre, as already noticed, and have seen in that form of it patients apparently doing well, the ecchymosis disappearing, &c. but I never saw a case cured by that remedy.

Such failures of this boasted prophylactic (lemon-juice,) introduced, as Sir Gilbert Blane tells us, into the navy in 1795, led me to look carefully into that gentleman's writings, as well as those of Lind, Trotter, and others of bygone days, and reflecting upon the then mode of paying, victualling, clothing, bedding and berthing, and cleanliness of the men, &c. as well as of the methods then in use of keeping the ships clean and well ventilated, I clearly perceive that Sir G. Blane entirely overlooked his own personal exertions, in introducing a better system of general management than was known to naval officers before his time, and which has been yearly improving ever since. The effect of this has been to afford great comfort and a high state of health in the navy, scarcely known under any other circumstances at home or abroad, so much so, that few of our naval surgeons now serving in men of war have ever seen a case of scurvy, although I do know that it occurred in a frigate, on her passage from India, and raged to a great extent, but was not benefited by the liberal use of good lemon-juice.

Sir Gilbert, I say, overlooked all the improvements which were then gradually creeping into the service, in favour of a preconceived notion which he had adopted regarding lemon-juice, not only as a preventive of scurvy, but as a specific in its cure. Now every one will acknowledge that we have few, perhaps not one specific remedy for a single disease, of the innumerable ills which flesh is heir to. The word *specific* closes entirely the eyes of the believer in it, is a balm of ease to the indolent, and clogs the exertions of the more active, who, finding the gale of professional opinion in its favour, are induced to sleep on their posts rather than brave the storm.

" Much, however," (says Dr Trotter in his 3d vol. page 388.) " as I depend on the citric acid for the cure of scurvy, I must still assert, that the prevention ought to be trusted to esculent vegetables, if they can be procured ;" but he adds, " It is unnatural in the winter months of our climate to give a man lemonade."

Page 338.—" From the whole of my reports from surgeons of ships of the line, I do not find a single fact that can justify the general use of lemon-juice, as lately administered." " The long cruises and restless mode of duty in the fleet, in 1800, joined to the use of this cold and fat consuming beverage, had reduced the strength and vigour of body in a wonderful manner in every ship."

Thus Dr Trotter at all events meets me half-way. He says, lemon-juice is not a preventive, and shows what I have years ago remarked in my reports that it is positively hurtful.

A due attention to diet, clothing, (including bedding,) cleanliness of the person, dry cleaning the men's berths, having airing stoves in them in damp weather, strewing them occasionally with dry chloride of lime, exercise regularly taken in the open air, and what must never be lost sight of, cheerful conversation, merry games, and other innocent amusements, are the principal preventives of scurvy.

The diet at present in use in Her Majesty's ships, (exclusive of lemon-juice, which is no part of the victualling,) cannot fail to secure exemption from anything approaching to scurvy, even during the longest cruises; that is, taking into consideration the high state of cleanliness in every respect, the order and discipline observed, as well as the clothing and comfortable lodgings, the men enjoy. In short, nothing that a liberal and enlightened government could do has been omitted to render the life of a man of war's man in all respects agreeable, not only as regards his diet, but his wages, his prize-money, his pension, and, in the event of inability for farther usefulness, either from old age, wounds or disease, his comfortable home in Greenwich hospital, should he desire it.

I have only to add, let merchant ships, transports, and others, imitate the diet, clothing, and comforts of ships of war, and I have no hesitation in asserting, that many lives would be annually saved, and much misery prevented.

Scale of diet.—Every man and boy borne on the ship's books shall have the *daily* quantities of provisions contained in the following scale, viz.—

Bread, 1 pound; beer, 1 gallon; fresh meat, 1 pound; vegetables, ½ pound; oatmeal, not more than ½ pint per week; sugar, 1½ ounce; cocoa, 1 ounce; tea, ¼ ounce.

When fresh meat and vegetables are not issued, there shall be allowed in lieu thereof, on alternate days, viz.

Salt beef, ¾ pounds; flour, ¾ pounds; salt pork, ¾ pounds; peas ½ pint.

When the issue of salt meat is renewed after fresh meat has been served, it must be recollected, that the salt meat on the first day of issue, is not to be of the same species as that issued on the last day, before fresh meat was served.

On the days on which flour is ordered to be issued, suet and raisins, or currants, may be substituted for a portion of the flour.

One pound of raisins being considered equal to one pound of flour; half a pound of currants ditto; half a pound of suet ditto.

An allowance of *salt*[*] should be issued with the fresh meat, and an allowance of mustard with salt meat.

In case it should be found necessary to alter any of these species of provisions, and to issue others as their substitutes, it is to be observed, that

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[*] It should be borne in mind that salt which has been used to cure meat is unfit for the end in view, unless it be redissolved, and again crystallized.

1¼ lb. of soft bread, or 1 lb. of rice, or 1 lb. of flour is to be considered equal to 1 lb. of biscuit.

1 pint of wine, or ½ pint of spirits, equal to 1 gallon of beer.

1 oz. of coffee, or ¼ oz. of tea, equal to 1 oz. of cocoa.

1 lb. of rice, or 1 pint of calavances, or 1 pint of dholl, equal to 1 pint of peas.

1 lb. of rice equal to 1 quart of oatmeal.

1 lb. of butter equal to 1 lb. of sugar.

2 lbs. of cheese equal to 1 lb. of cocoa.

¼ lb. of onions, or leeks equal to 1 lb. of other vegetables.

The before-mentioned provisions are to be served out by full imperial weights and measures.

Means of Cure.—Having been much distressed by the prevalence of scurvy during a voyage unusually protracted, in 1833, and having tried both lemon-juice alone, and combined with vinegar and nitre as remedies, without success, I was led, on my return to England, in 1834, to peruse Stevens on the Blood, from which I gathered sufficient encouragement, (in absence of everything upon which any reliance could be placed,) to try nitre dissolved in water, unaided by lemon-juice or any other acid; and it has proved so successful in my hands, in the almost innumerable variety of forms in which *scorbutus* and *purpura* present themselves, as to induce me to trouble my readers with a short account of the method which I adopted in the exhibition of it; but I beg it to be clearly understood, that there are other means to be had recourse to in almost every case, and which must be left in a great measure to the judgment of the medical officer in attendance.

The moment that I observe symptoms of scurvy making their appearance, I carefully examine every individual in the ship, and take down a note of such as it appears to me require to be put upon treatment, as well as of others, in whom the symptoms are obscure, in order to have my eye to them at all musters. To the old and otherwise infirm, I give out spare blankets, and distribute hospital clothing to the worst cases, as far as they will go. Those put upon the sick list have their salt ration and lemon-juice stopped, their bowels carefully attended to, and an allowance of preserved meat, barley, rice, sago, and tea; wine also, even above their regular allowance prescribed for them, if it shall appear necessary; and from two to four drachms of nitre dissolved in six or eight ounces of water given to each in divided doses in the course of the day. I have generally given at three, sometimes at four different times, at equal intervals, occasionally adding a drop of *Ol. Menth. pip.* to each dose. I have thought that advantage was derived, in some cases, from the addition of a tea spoonful of gin (Holland) or *Spirit. Ether. Nitric.* in a similar manner.

In this way I have often with much satisfaction remarked a visible improvement in three days; but, in general, a much longer time is required to bring about a favourable change. I have frequently known patients very much averse to the medicine at first, saying that it caused vomiting, purging, and so forth; but never knew one attempt to refuse it after the second or third day, all coming to the hospital cheerfully at the appointed time to get their allowance, and often pushing one another aside, trying to get first in for the expected dose. The relief it affords to the sinking at the pit of the stomach, so very much referred to in *purpura*, is almost incredible. Indeed, had I not so often witnessed the remarkable change for the better in a short time, I could not credit the accounts given by the patients themselves, raised as it were from death's door, to a state of ease, and returning health.

Blanchard, who wrote in 1684, says, " bleeding is of no use; vomits and purgatives are sometimes necessary,—all *acids* viscid, and salt foods are pernicious." Bachstrom observes of nitre, " that as it is a copious ingredient in most plants, it may perhaps be serviceable!"

I may notice that, in giving laxative medicine, I have preferred sulphate of magnesia, dissolved in a bitter infusion, *i. e.* an infusion of quassia or gentian root—with lemon peel. Whatever be used, it is not of advantage to give too powerful doses. Articles from the vegetable kingdom and neutral salts answer best.

In diarrhœa and dysentery, I have found a useful adjuvant in a mixture, consisting of aromatic mixture, two drachms, water of ammonia a drachm and a half, laudanum, one drachm or more, of which a tablespoonful after every liquid motion was given. By giving this medicine at same time with the nitre, I have generally succeeded in arresting the purging.

I have often been forced to have recourse to a solution of nitre obtained from gunpowder, and have thought it more efficacious as a remedy, than a solution from crystallized nitre itself; and I have heard of some strange modes of preparing it, and know of others. Mr Paterson, for instance, says, in his treatise before noticed, page 28. " One pound of gunpowder will yield nearly *five* ounces of nitre."—" This, however," he adds, " might prove a disagreeable alternative."—And Mr C. Cameron tells us, he could *extract* nitre from gunpowder; but does not say a word as to his method of doing so.

Now gunpowder being simply a mechanical mixture—consisting of nitre, 75 + sulphur 15 + charcoal, 10. Every pound weight of it will yield exactly *twelve* ounces of nitre, which can very easily be obtained in solution, the other two ingredients being insoluble in common water.

I add six pounds of warm fresh water to half a pound of gunpowder, put into a wash-hand jug, or any such deep vessel, giving it a stir, and then hang it up to the beams for twelve hours. I. have nothing further to do than pour off the clear supernatant solution, which is ready to be served out in any dose that may be required. Half a pint of the solution, of course, contains four drachms of nitre.

In 1835, I went out to Van Diemen's Land with a very intelligent officer, captain of the guard, from whom I had occasion to beg sixty rounds of ball cartridge; and as he was curious to know the use I was to put it to, I of course let him into the secret. At the time spoken of, I had a tolerably long list of scorbutic cases; many of the people looking very much shaken. As we proceeded on our voyage, the men assumed a more healthy aspect; so much was this the case, that when we anchored in the port of our destination, every man who embarked (except one killed) was not only able to attend muster, but all were landed in a healthy state. Captain M. who had carefully noticed the effects produced by his supply of gunpowder, remarked, that he would always remember me as the medico, who could cure scurvy with sixty rounds of ball cartridge.

Art. II.—*Contributions to Intra-Uterine Pathology.* Part II. *On the Inflammatory origin of some varieties of Hernia and Malformation in the Fœtus.* By James Y. Simpson, M. D., Fellow of the Royal College of Physicians, Edinburgh, Lecturer on Midwifery, &c. [Continued from Volume L. p. 416.]

In following out the line of inquiry pointed out in the concluding part of our last communication, we have now to direct our attention to the *indirect* morbid effects which occasionally result from Peritonitis in the Fœtus. In pursuing this subject we shall consider in the following remarks, 1*st*, the pathological relations of fœtal peritonitis in the production of certain congenital forms of umbilical, diaphragmatic, and inguinal hernia,—and 2*dly*, we shall endeavour to trace the primary origin of some varieties of malformation among the abdominal and pelvic viscera to the same proximate cause. *Lastly*, in connection with this latter subject, we shall briefly advert to one or two circumstances explanatory of the dependance of other species of malformation upon the effects of inflammatory action in the early embryo.

We reserve the observations that we have collected on ascites and hydrocele—two other occasional indirect results of peritonitis in the fœtus—till we come to speak of the pathology of intra-uterine dropsy.

CONGENITAL HERNIAE.

Umbilical Hernia.—During the progress of embryonic development, the abdominal viscera—like those of other parts of the body—pass through a number of changes both in their own intrinsic forms, and in their relative position to one another, and to the adjoining organs. Thus, in the embryo of the tenth or twelfth week, the abdomen is still so far open in the course of its mesial line, that some folds of the intestines are generally found situated at that time in the fœtal extremity of the sheath of the umbilical cord, or, to speak more precisely, in the sheath of the vitelline duct, as it is inclosed within that of the umbilical cord. In this way we have in embryos of the above early age a kind of natural but temporary umbilical hernia. In some cases this hernial protrusion is liable to be rendered a permanent and morbid type of structure in consequence of such diseased actions having been excited in these parts, as impede or prevent the usual changes of structure and of position which follow in the normal course of fœtal development. The particular diseased action which may lead to this deficiency of development is no doubt subject to considerable variations in its nature in different instances; but in some cases it would certainly seem to be intimately connected with, if not strictly and originally dependent upon, the effects of peritoneal inflammation. Nor is it difficult to understand the mechanism by which the pathological cause in question might lead to the pathological effect which we here attribute to it.

For if the protruded abdominal viscera should once happen to become united by inflammatory adhesion to some part of the walls of the sheath which contains them, the effect of this adhesion would be such a continuous distension of that sheath by the retained and displaced bowels as might prevent its natural closure. We know from various analogous instances in the history of malformations, that the effect of the simple retention of a displaced organ in any of the temporary cavities or openings of the body, is often sufficient to interrupt the process of their obliteration, as, for example, in the congenital inguinal hernia which we have afterwards to describe; and while we own that, in reference to umbilical hernia, our proof is deficient in so far that we are still unable to cite any direct observations to show the first commencement of the formation of this affection in peritonitic adhesions between the bowel and the sac in the early embryo, it is yet, however, rendered so far complete by our now knowing the facility and frequency with which such morbid adhesions occur on the peritoneal membrane of the fœtus. Besides, we have a kind of test of the truth of the whole opinion in tracing the history of cases of umbilical hernia,—for if this diseased state occasionally originated in such inflammatory adhesions as I have here supposed, it is evident that the existence of these adhesions would necessarily render the protruded bowel irreducible at birth. Accordingly, as already stated in my former communication, we find Scarpa declaring it as the result of his experience, that the complete artificial reduction of the intestine in congenital umbilical hernia is chiefly opposed by morbid connections existing between the protruded viscera and the walls of the hernial sac. I have previously had occasion to refer to a case of umbilical hernia in Scarpa's work, in which these morbid adhesions have been represented by him; and the same circumstance seems to have been previously remarked in a similar example by Fried,* the neck of the sac being described by this latter author, as intimately united to the intestines (*annuli intestinis arctè accreti.*)

Jules Cloquet has more recently described and represented an instance in which similar adhesions from fœtal peritonitis existed under the same circumstances.

Case XXVI.—In a female child that died a few hours after birth, there existed at the right side of the umbilicus a round perforation with red ulcerated edges, and through it a great portion of the small intestines had escaped. " The protruded convolutions of bowel, about a foot and a half long, were united together into one mass by membranous adhesions, some of which appeared recent and were easily torn, whilst others were old and solid; but both were evidently the effect of albuminous effusion from the inflamed intestines. The portion of mesentery supporting the convolutions strongly adhered to the circumference of the ulceration, and thus prevented the reduction of the bundle of intestine. The intestine itself had its coats firm and thicker than natural."†

After the above remarks were prepared for the press, my friend Dr J. Reid directed my attention to the following illustrative instance of umbilical hernia in the body of a malformed fœtus that he was beginning to submit to a minute anatomical dissection.

Case XXVI.—In a diminutive male fœtus wanting the head and neck, and born (as acephalous monsters always are) a co-twin with a second and perfect child, the situation of the umbilicus was occupied by a hernial tumour of the size of a small walnut. The tumour was considerably contracted at its neck. On opening it, the *caput cæcum* and several folds of the small intestines were found in its cavity. The *caput cæcum* and its *appendix vermicularis* were loose, but one or two folds of the lower part of the ileum for about an inch in extent, were firmly attached to and incorporated with the walls of the hernial sac. These walls consisted of an expansion of the sheath of the umbilical cord. The mesentery of the adherent and of the adjoining portions of intestines was much contracted and stretched in consequence of this morbid attachment of the bowel. The union between the hernial sac and adherent piece of intestine was so complete, that it appeared to Dr Reid and myself, impossible to doubt but that the inflammatory action which gave rise to it must have occurred at a very early stage of fœtal life. Indeed, the contiguous attached surfaces of the bowel and sac were so perfectly amalgamated together, that they looked as if they were covered by a continuity of the same serous membrane.

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* Sandifort's Thesaurus Dissertationum, Tom. i. p. 314.

† Surgical Pathology, (London 1832,) p. 162, Pl. xi. fig. 4.

In bringing forward these observations upon the probable inflammatory origin of some cases of congenital umbilical hernia, I would at the same time remark, that we by no means doubt but that the adhesions which are detected at birth between the intestine and the sac are sometimes merely secondary results, or the effects of accidental peritonitis supervening among the abdominal viscera, which have already become protruded in consequence of other pathological states of the embryo. Most of those cases which we have alluded to in our former paper as instances of peritonitic adhesions in extensive extroversions of the abdominal contents, are probably referrible to this last class; and the same remark will, we believe, apply to a case of extroversion of the intestines depicted by Isidore St Hilaire,* where the existence of films of coagulable lymph upon the peritoneum is well shown in the appended plate, though the morbid appearance itself does not seem to be adverted to in the text of the author.

Diaphragmatic Hernia.—The diaphragm is not, as is now well known, so early formed in the course of development, as the principal thoracic and abdominal viscera lying on either side of it are. At an early period, therefore, of embryonic life, previously to this septum being completed, some of the contiguous viscera of the thorax and abdomen are necessarily in contact with one another; and the same will hold true to a more limited extent in most of those instances in which any part of the diaphragm remains open in consequence of arrested or defective development. In either of these cases, but more particularly in the former, the pleural and peritoneal surfaces of the contiguous viscera may, by taking on inflammatory action, become morbidly adherent to one another. If such adhesions are formed early in embryonic life, they will almost in all cases necessarily lead to the displacement of some of those organs that were the seat of them; for as the body elongates and enlarges in the course of fœtal growth, the more loose of the morbidly attached viscera will be gradually and mechanically dragged out of their natural situation by being obliged to follow the change of distance and position assumed by those more fixed viscera to which they are united. In this way a case of congenital diaphragmatic hernia may be formed either by the viscera of the thorax being partially drawn down into the abdomen, or, what oftener happens, from some of the more loose abdominal viscera, as the stomach or intestines, being dragged into the thorax, in consequence of their having become morbidly attached to one or other of the lungs, or to some portion of the costal or mediastinal pleura, all of which are comparatively much more fixed parts. Probably, for example, we may refer to such an origin, a case of congenital diaphragmatic hernia recorded by Bartholin* and Clauder.† In this instance, the stomach, duodenum, pancreas, spleen, and part of the colon, were situated in the left cavity of the thorax, and the first of these organs (the stomach) adhered by strong morbid bands (*ligamentis*) to the diaphragm and pleura. In a similar case of diaphragmatic hernia published by Reisig,‡ the stomach was lying in the cavity of the thorax, and was intimately united to the left lung by a false membrane or *ligament*, (as this author also terms the band of morbid adhesion.) This false membrane was evidently of very old formation, inasmuch as it had so completely assumed the structure of serous tissue, that Reisig has been led to describe it as apparently formed by a duplication of the pleura itself, (*videbatur duplicatio membranæ externæ quæ materiam pulmonum circumdat.)*

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* Histoire des Anomalies de l'Organization, Pl. vi.

Inguinal Hernia.—The production of other forms of congenital hernia, besides the umbilical and diaphragmatic, may, with even more justice and certainty, be traced to the previous existence and effects of peritonitis in the fœtus. Thus the morbid adhesions resulting from inflammation of the peritoneum during intra-uterine life may, we believe, sometimes act as the pathological cause of that form of congenital hernia that was first accurately described by Haller and the two Hunters, and which consists in the descent of a portion of the intestines or omentum into the *tunica vaginalis* of the testicle,§ through the unobliterated canal originally existing between that cavity and the general cavity of the peritonæum.

Mr Pott long ago remarked, that, in this variety of congenital hernia, morbid connections of the protruded bowels to the sac containing them, and particularly to the testicle, were more frequent than in any other form of rupture. " In this kind of hernia," he observes, " I have more frequently found connections and adhesions of the parts to each other, than in the common one; but there is one kind of connection sometimes met with which can never be found in that which is a common hernial sac, and which may require the dexterity of an operator to set free,—I mean that of the intestines with the testicle, from which I have more than once experienced a good deal of trouble."*

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* Histor. Anat. Rar. Cent. vi. Tom. iii. p. 287.

† Ephemerid. Nat. Curiosor. Dec. ii. An. v. p. 193.

‡ De Ventriculo in Cavo Thoracis situ Congenito, Berlin, 1823, p. 8. It should have been stated that Reisig's case occurred in the body of a ferret, (Viverra Zibetha.)

§ A hernial protrusion of the same kind occasionally occurs into the corresponding process of Nuck in the female.—See Wrisberg, Comm. Medici. Obstet., &c. p. 234.

Surgical pathologists have very generally subscribed to the accuracy of the preceding observations of Mr Pott, and the circumstance mentioned by him is itself, we believe, explicable upon the two collateral facts, 1*st*, that the displaced viscera in this form of hernia are, on the whole, for a longer period protruded, and in contact with the walls of the containing sac, than in any other species of hernial disease, and hence more liable to the chances of adhesive inflammation ; and, 2*d*, adhesions in this species of hernia are frequent, because in some cases the hernial displacement strictly originates in, or is produced by the previous existence of such adhesions, as an effect of peritoneal inflammation in the fœtus. We shall quote a case from Wrisberg illustrative of this last point.†

CASE XXVII.—In a child that was born about the eighth month of utero-gestation, the author alluded to found the right testicle descended into the scrotum, but the left was still situated at the inguinal ring. This latter (the left) was very mobile, and could be pressed slightly downwards, and still more easily upwards into the cavity of the abdomen. The child died in a few days after birth. On opening the abdomen, the omentum was seen drawn into the left iliac region, and was united to the ***tunica albuginea*** of the testicle by three threads ***(tribus filis albugineæ testiculi accretum.)*** The testicle descended through the abdominal ring on pressure, but it was drawn back when the omentum was stretched, by having its cavity inflated through the foramen of Winslow. The process of peritonæum forming the ***tunica vaginalis*** stretched downwards nearly to the middle of the scrotum.

Wrisberg does not mention any opinion as to the nature of the morbid threads which existed in this case ; but with the more advanced knowledge that we possess at the present day, with regard to the origin of pathological products, it is impossible to doubt but that such adhesions and threads, as he describes, could only be the effect of previous adhesive inflammation in the morbidly accreted surfaces.

Cases analogous to that given by Wrisberg have been recorded by other authors. Thus Jobert‡ states that, in one instance, he found in the fœtus the cœcum adhering to the testicle, and on the point of passing the ring; and Soemmerring[*] and Schwenke[†] have each met with the *appendix vermiformis* adhering to the testicle. If in any of these instances the testicle had made its way down into the scrotum with the abdominal viscus, to which it was morbidly attached still adhering to its surface, it is evident that it would have produced a case of that form of congenital inguinal hernia which has been referred to,—namely, with the protruded abdominal contents placed in the serous cavity of the *tunica vaginalis.* Sandifort[‡] has given the following history of a case of congenital hernia, in which the child was born with the hernia in this way already completely formed.

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* Chirurgical Works (1779), Vol. ii. p. 162.

† Commentarii Medici, Obstetrici, &c. p. 229

‡ Traité des Maladies Chirurgicales du Canal Intestinal, Tome ii. p. 332.

Case XXVIII.—A hernia was present in the right side of the scrotum at birth. It was not, however, till the child was about three months old, that any remedial measure was resorted to. The hernia was then attempted to be completely reduced, and a truss was applied for the retention of the protruded viscera. This proceeding was immediately followed by violent symptoms of strangulation and death. On the *post mortem* inspection of the body, it was discovered that the hernia was formed by the cœcum and the extremity of the ileum. The *appendix vermiformis* of the cœcum adhered in part to the testicle, and in part to the bottom of the herniary sac and *tunica vaginalis*; and, at the place of its adherence to the testicle, this appendix was become harder, or somewhat more compact than natural (*duriusculus*),—a circumstance which renders it probable that the inflammatory action, and the effusion of coagulable lymph resulting from it, had been of so chronic a nature, as to have existed before the descent of the testicle, and consequently before the formation of the hernia.

It is unnecessary here to multiply individual cases from Wrisberg, Meckel, Pelletan, Langenbeck and others, for the purpose of proving that morbid adhesions between the intestinal viscera and testicle, similar to those that we have shown to be occasionally formed during the descent of the latter organ, still continue to subsist, in congenital hernia, even (as in the case of Sandifort and others) after the testicle is completely descended, and the hernia fully formed. "The experience of most individuals," as Mr Lawrence has remarked in his learned Treatise on Hernia, "must have furnished opportunities of observing how frequently the viscera are connected to the testes in congenital ruptures."[§]

In closing these remarks upon congenital herniæ, we would beg to add, that, in pointing out the mode or modes in which they are produced as a result of inflammation of the fœtus, we by no means wish to maintain the constancy of their origin in this manner. We are, on the other hand, perfectly convinced, that perhaps in the majority of cases, they are formed independently of any such preceding morbid action. All that we here advocate is their occasional origin from inflammatory adhesions; and even those pathologists who may not entirely coincide with me in opinion upon this point will still find in the cases that I have adduced a number of proofs of another fact in intra-uterine pathology that I would wish to enforce, namely, the great frequency of inflammatory action in the structures of the fœtus.

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[*] See his German translation of Baillie's Anatomy, p. 97 and 123, or Danz.' Zergliederungskunde des Ungebohrnen Kindes, Bd. ii. s. 164.

[†] Ueber die Bruche, &c. or, Meckel's Pathologischen Anatomie, Bd. iii. s. 419.

[‡] Icones Herniæ Inguinalis Congenitæ, p. 12, tab. i. ii. and iii.

[§] Treatise on Hernia, (1838), p. 568.

MALFORMATIONS OF THE ABDOMINAL AND PELVIC VISCERA.

Various malformations, both in the way of displacement, and of arrested development, in the digestive, urinary, and genital organs, may, I believe, be justly considered as indirectly produced by Peritonitis in the fœtus.

The occurrence of abdominal inflammation during the earlier periods of intra-uterine life may lead to the effects which I here attribute to it in various modes. We have already had occasion to remark, that the different chylopoetic viscera undergo numerous changes, both in their physical forms, and in their absolute and relative situations, from the time that the intestinal canal first appears in the embryo as a mere pouch or bag, formed by a segment of the yolk or umbilical vesicle, till the period of the full development of these organs in the more advanced fœtus. The ovaries and testes also present very considerable changes in their locality during the progress of embryonic evolution, and some of the pelvic organs of the adult, as the uterus and urinary bladder, are, in respect of position, abdominal organs in the fœtus.

Now, if peritonitic inflammation should happen to take place on the surface of any one or more of these viscera, at the time that they still occupy a position different from that which naturally pertains to them in extra-uterine life, and if this inflammation gives rise to an effusion of coagulable lymph binding them (as we know it is very liable to do) to any contiguous surface, it is evident that the inflamed organ or organs might in this way be prevented from undergoing any further change of situation, and subsequently come to present to us an example of malformation by displacement. In such a case we would find, in general, the displaced organ morbidly fixed in one or other of those situations which it normally but temporarily assumes during the course of development,—unless, indeed, where it happened to be dragged out of this position by the ulterior changes and movements in the part or viscus to which it was adherent. And again it seems probable, that, in other instances of displacement of the abdominal organs connected with peritonitis, one or more of them may be found drawn away from those positions which they occupy during intra-uterine life, in consequence of the morbid contractile power sometimes exerted by the false membrane formed upon their surface—all false membranes when they degenerate into fibrous structure having, like the tissue of external cicatrices and other morbid fibrous tissues, a greater or less tendency to such contractions. In my former communication, I have already quoted a case from Morgagni showing the fact, that a peritonitic pseudo-membrane in the fœtus sometimes exerts by its contractile influence such a power of displacement as we here allude to.

Altogether, then, in malformations by displacement among the abdominal viscera, resulting from fœtal peritonitis, the displaced organ may, as we believe, either be seen, *first*, in some of the temporary positions assumed by them, during their evolution, and which they occasionally continue to occupy in cases simply of arrested development, or, *secondly*, they may be found drawn to a greater or less extent out of these positions, in consequence of the operation of those agencies to which we have adverted.

When we detect in the adult an instance of partial displacement of some of the abdominal viscera connected with the existence of an old pseudo-membrane upon their peritonitic surface, it may be difficult, or altogether impossible, to trace whether the formation of this membrane may have taken place during early fœtal life, and acted as the immediate cause of the displacement, or has only been the result of peritonitic inflammation, which has supervened at some period subsequent to the occurrence of the displacement.

In most of the cases of partial transposition among the intestinal viscera themselves that have been hitherto observed, the *origo mali* seems to have consisted in a displacement upwards, and towards the left side of the *caput cæcum* and ascending colon; and, in consequence of the right iliac and lumbar regions not being filled up as usual with these bowels, the looser folds of the small intestines come to occupy that portion of the abdominal cavity. Without entering into the details of the individual cases of this kind that have been put upon record by Salzmann,[*] Schacher,[†] Mery,[‡] Sandifort,[§] and others,[||] I shall content myself with

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[*] Decas Observationum illust. Anatomicarum, p. 53.

[†] De Morbis a situ Intestinorum praternaturali.

[‡] Memoires de l'Academie des Sciences, 1716, p. 179.

[§] Observationes Anatomico-Pathologicæ, Lib. iii. p. 11.

[||] See some interesting original cases, together with references to others, by Dr J. Reid, in the Edinburgh Medical and Surgical Journal, Vol. xlvi. Dr Reid informs me, that he very lately met with a case in which the *caput cæcum* was placed in the right lumbar region. It had apparently never been allowed to descend into its natural poquoting, as a sufficient illustration of the doctrine which we propose, the following remarkable case, for the notes of which I am indebted to my friend, Mr Forbes Angus.

Case XXIX.—In a strong middle-aged man, who died of continued fever, the *caput cæcum* was placed not in the right iliac, but in the lower part of the left lumbar and iliac region. From it the colon ascended nearly in the mesial line, and then, after making an acute turn, it occupied during the remainder of its course its natural position. The displaced *caput cæcum* thus lay contiguous to the sigmoid flexure, and was united to it by an old false membrane. The *caput cæcum* was further retained by other strong morbid adhesions, which stretched between it and the lining membranes of the pelvis. The small intestines occupied the position of the displaced cœcum and ascending colon, and were all situated towards the right side of the abdomen. Consequently the lower extremity of the ileum, instead of following its usual direction, had to run from right to left, in order to join the large intestine.

In bringing forward the above case, we freely admit, that we have no positive proof to offer, that the existing old morbid adhesions were formed at such an age in fœtal life as would have enabled them mechanically to effect the displacement of the *caput cæcum*. At the same time, however, we derive some probability of their formation at that early period, not only from considering that their necessary agency would have been such as to have produced the result in question, but from our having in other analogous cases decisive evidence that morbid peritonitic adhesions formed during intra-uterine life have, in the indirect mode that we have indicated, occasionally given rise to marked displacement of portions of the intestinal canal. In fact, the particular instances of congenital and fœtal hernia which we have considered under the previous section, may in reality be looked upon as so many examples of true malformations by displacement resulting from such a cause. We make this remark in reference to the various examples of displacement of the intestines that we have cited from Bartholin, Reisig, Cloquet, &c. under the heads of umbilical and diaphragmatic hernia; and it perhaps applies in a still more direct manner to the cases that we have quoted from Sandifort, Jobert, and others, in which the inflammatory adhesions resulting from previous fœtal peritonitis produced various displacements of the cœcum,

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sition in the right iliac fossa, in consequence of the vermiform process (which was completely on the stretch) having contracted very strong adhesions to the inferior surface of the liver. The case is another illustration of the remarks I have made in the text.

omentum, &c., by the testicle to which they were morbidly united dragging them more or less along with it during its descent out of the abdominal cavity. But, in addition to these, we may here also recall to our recollection that other analogous facts seem to show, that the occasional retention of the testicle within the abdomen for some years after birth, or, as sometimes happens, during the whole of life, may depend upon a similar cause, viz. on inflammatory adhesions formed between the testicle with the more fixed abdominal organs which it meets with during its descent. Thus Cloquet * mentions an instance in which he found, in an aged adult, the left testis natural in size, but retained within the abdomen, one inch above the upper opening of the inguinal canal, by a strong, short, rounded, *fibrous cord or false membrane*, which bound the epididymis to the sigmoid flexure of the colon. And we know further, from the researches of Mr Serres,† that in cases such as this, the cœcum will not in general occupy its own natural position within the abdominal cavity, since it has been shown that there exists a fixed relation between the position of that bowel and the position of the testicle in the male, and the ovary in the female.

The following instance of morbid adhesion of one of the testicles within the abdominal cavity, and of partial displacement of the intestines in connection with the same cause, furnishes an apposite illustration of some of the preceding remarks.

Case XXX.—On dissecting along with Mr F. Angus, (1st November 1838,) the body of an anencephalic fœtus, I found, on opening the abdomen, particles of coagulable lymph on several points of the abdominal peritoneum, and upon the upper surface of the right lobe of the liver. The contiguous folds of the small intestines were in various places agglutinated by coagulable lymph. The small intestines were in several points, also, adherent to the large, as for instance very extensively along the transverse and descending colon, by the medium of a strong web of coagulable lymph. The *caput cæcum* was displaced. It lay fully an inch above its natural situation, and was bound down to the peritoneum, covering the right kidney by a quantity of false membrane. The surface of the large intestine was very adherent to the abdominal peritoneum at the top of the descending colon. At its sigmoid flexure this bowel was twisted forward; it formed one fold in the left iliac region, and then stretched upwards and across for more than an inch, till it reached the right lumbar region, and touched the *appendix vermiformis*, when it again turned round at a very acute angle, and ran downwards behind the urinary bladder. The pelvic viscera were matted together by coagulable lymph; and the posterior surface of the bladder was intimately united by false membrane to the first mentioned fold of the sigmoid flexure, and to that part of it situated immediately above the rectum. A fold of small intestine lay in the angle of the second fold of the sigmoid flexure, and was morbidly adherent to the mesocolon. Two other folds of the small intestines were firmly bound down by morbid adhesions into the right iliac fossa, and thus occupied the natural situation of the *caput cœcum*. The right testicle lay nearly contiguous to them, and was there imbedded in a quantity of coagulable lymph, which in a similar manner strongly attached it to the peritoneal surface of the iliac fossa. The left testicle was not morbidly adherent. The lower surface of the right lobe of the liver was studded with numerous small masses, which on section had all the usual physical appearances of semi-cretaceous tubercles. A few such bodies were also seen on the lower surface of the left lobe, and some of them were imbedded two or three lines deep in the substance of the organ.[*] The spleen was small and healthy. The thoracic organs were sound. The lungs were solid, the child never having breathed.

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* Recherches sur les Causes et Anat. des Hernies Abdominales, p. 24, Pl. V. fig. 2.

† Isid. St Hilaire, Histoire des Anomalies de l'Organization, Tom. i. p. 378.

Case XXXI.—On the body of a dead male fœtus, sent to me by Mr David Angus of Glasgow, I found numerous adhesions from coagulable lymph in different parts of the abdominal cavity. The spleen was covered on its convex surface with a web of false membrane. A fold of the sigmoid flexure of the colon crossed completely over to the right side of the vertebral column, and was firmly retained by morbid adhesions to the peritoneum, in that anormal situation. The *caput cœcum* and its vermiform process, were placed in the right lumbar region.[†]

As one additional illustration, from among many others that might be quoted, of the strong effects of morbid contractions and adhesions in producing malformations by displacement in the manner alluded to, I may here refer to a remarkable case of congenital hernia of the ovary represented by Billard [*] in the atlas attached to his work on the diseases of infants. The sketch which is given of the case shows that, in consequence of the great and apparently morbid shortening of the left broad ligament of the uterus, the ovary, which is naturally very intimately attached to this ligament, has been dragged during intra-uterine life through the inguinal canal, and the uterus itself, by a similar mechanism, has been partially displaced towards the left side. [†] The kidney also of the same side has, as seen in the plate, been dragged downwards below the level of that of the opposite side by the contraction of the cellular tissue around it, and by a fold of membrane connecting it intimately with the abdominal orifice of the hernial sac. The renal artery and vein have yielded to the same cause of displacement, and are seen to have become elongated in consequence of it. In fact, after the ovary had once become displaced and fixed, it would seem that all those other more loose and moveable viscera of the left side of the abdominal cavity, which were in any way intimately and organically connected with it, and the uterine ligaments, came themselves to be displaced in turn by being held in morbid approximation to the site of the protruded organ, and thus not allowed to follow those gradual changes of relative distance and position that naturally occur under the general enlargement of the abdomen in the course of development.

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[*] Bonetus, in his Sepulchretum Anatomicum, (Tom. iii. p. 104,) mentions a case exhibiting an analogous morbid appearance in the fœtal liver. " In jecore fœtus abortivi sex mensium, ad lobum infimum detectus est tumor inequalis, asper tophorum particulis tanquam confractis cerasornm nucleis, absque pure, tamen plenus visu tactuque durus." Wrisberg (Sandifort's Thesaurus Dissertationum, Tom. iii. p. 214,) gives a case in which several biliary calculi were detected in the gall-bladder of a woman who died after parturition. The child died seven weeks after birth, and from the dissection it appeared that a tendency to the formation of similar morbid concretions in the same organ had been transmitted from the mother to her offspring, for, on the examination of its body, " vera concrementa calculosa, salbuli instar," were found in the gall-bladder. The liver of this infant was at the same time large and indurated, a condition which we may look upon as indicating a chronic, and hence probably an intra-uterine diseased state.

[†] This and the preceding case were shown to the Anatomical Society—and I have preparations from them in my Museum.

In an essay on abortion as dependent on morbid organic conditions of the uterus, Madame Boivin has shown that the existence of old inflammatory adhesions between the uterus or uterine appendages, and any of the more fixed organs in their neighbourood, may lead to an early expulsion of the embryo, by preventing, during pregnancy, the uterine tumour becoming developed beyond a fixed and limited point. The same author has further suggested that the peritoneal inflammation producing such adhesions may occasionally occur during intra-uterine life, when the uterus is strictly an abdominal and not a pelvic organ. [‡] In my former communication, I have detailed one instance (Case VII.) in which I found some patches of coagulable lymph adhering to the right Fallopian tube of a fœtus that had died *in utero* about the seventh month of pregnancy. Unless, however, this lymph was thrown out in large quantities, and formed very strong false membranes, it is doubtful whether it could have persisted for such a long period after birth, as Madame Boivin supposes. At least we know, that, after the lapse of a considerable time, old effused lymph or false membrane is often more or less entirely absorbed, as attested by numerous experiments and observations on adhesive inflammation of the peritoneum in the adult by Ribes, Beclard, Dupuytren, and others,—by the ulterior stethoscopic history of some cases of pneumonia that had reached the stage of hepatization,—and by what we have constant opportunities of seeing in cases of iritis in the transparent portion of the eye—an organ which affords us a beautiful microcosm for the accurate and direct observation of this and other similar pathological phenomena.

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[*] Atlas, Tab. x. Traité des Maladies des Enfans, p. 492.

[†] I have in my possession a preparation showing a well marked instance of anteversion of the uterus in the fœtus in consequence of either an original or a morbid shortening of both the round ligaments.

[‡] Recherches sur l'une des Causes de l'Avortement, p 57.

The consideration of the above pathological point suggests it as an interesting question, whether, in some of those cases of partial transposition of the viscera that we have described, the absence of all appearance of peritonitic adhesions or false membranes in the adult may not, in some cases, depend upon the absorption, during the intervening period, of those adhesive bands that led to this visceral displacement in the early fœtus? The facts adduced by the pathologists whom I have just named, give to such a supposition a degree, at least, of great probability, if not of inductive certainty; and hence a much greater number of visceral displacements may possibly have such an inflammatory origin as we have described, than can be proved by any anatomical examination of them in the adult subject.

We have already stated, that, in instances of malformation by displacement among the abdominal viscera arising from peritoneal inflammation in the early fœtus, the intestines were, in some cases, retained by their morbid adhesions in those positions which they were intended to occupy for a transitory period only during intra-uterine life, and so far we may look upon these adhesions as liable also at the same time to produce malformations by arrestment of development. This last effect, however, of abdominal inflammation in the embryo may be even more marked when the inflammatory action extends from the peritoneal surface to the structure of some of the more solid organs which the membrane envelopes. Thus, for an example of this inflammatory origin of some cases of malformations by *deficient development*, let us return for an instant to the testicles. I have already alluded to the effect produced by fœtal peritonitis in causing malformation by displacement of the organs. If the same organs from any general abdominal inflammation had, on both sides, their substance as well as their surface attacked by inflammatory or other morbid action, so as to produce such lesions of them as would impede or destroy their full development, their own organization would not only be prevented from arriving at perfection, but the power which their development appears to exercise upon the development of the other sexual organs and of the system in general, would be more or less completely suspended. In old age, the natural atrophy, and, during adult age, the destruction of these organs by disease or by operation, produces a very marked effect upon the stability of those anatomical and physiological changes which constitute the secondary sexual characters;—if they are disorganized or removed at or before puberty, then these secondary characters are only very imperfectly evolved, or remain altogether undeveloped; and if their disorganization were effected in an early stage of embryonic life, there are various facts, we conceive, which go far to show,* that the different subordinate sexual organs themselves would be arrested in their further development, and present to us at birth in the reproductive apparatus, under a permanent form, one or other of those various but naturally temporary types of fœtal sexual structure, the persistence of which constitutes a large class of the hermaphroditic malformations by deficiency which we occasionally meet with in the higher animals.

INFLAMMATORY ORIGIN OF SOME MALFORMATIONS IN OTHER PARTS OF THE BODY.

There appears to us to be every reason to believe, that inflammatory action in the other serous cavities of the embryo may lead to occasional malformations among the visceral contents of these cavities by a mechanism similar to that which I have endeavoured to trace in the results of fœtal peritonitis. If we confine ourselves to the selection of one or two examples only in illustration of the connection of pleuritis and pericarditis with thoracic malformations, we may refer to the case of partial extrophy of the heart, lately published by Dr O'Bryen.† Between the umbilicus and lower end of the sternum, in this instance, there existed at birth a hernial sac, containing some of the abdominal viscera in its inferior part, and a process of the sac of the pericardium in its upper. The apex of the left ventricle was drawn out in an elongated form into this process of pericardium, and attached to it "by old adhesions,"—the result, no doubt, of pericardiac inflammation in the fœtus.

Other varieties of displacement and extrophy of the thoracic organs might be shown to be not unfrequently connected in a similar, and even more marked manner, with intra-uterine inflammation and adhesion of the thoracic viscera to one another, and to those surfaces with which they happened, either naturally or accidentally, to be placed in contact. Breschet‡ has described one case of extrophy of the heart, in which the apex of this organ was retained in its anormal situation by an adhesion to the tongue;

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* See our article on Hermaphroditism in Todd's Cyclopædia of Anatomy, p. 733–34, &c.

† Transactions of the Provincial Medical Association, Vol. vi. with plates.

‡ Repertoire Gen. d'Anatomie, Tome ii. p. 24.

he mentions a second similar case in which the serous surface of the same organ was morbidly adherent to the mucous surface of the palate; and in a third instance reported by M. Bonfils,[*] in which the head and chest of the child were intimately united to the foetal aspect of the placenta, the "heart had contracted adhesions with the connecting placentary membrane, and been dragged by them out of the thorax to the superior and anterior part of that cavity, where, by the medium of similar morbid bands, it was attached also to the anterior part of the head. It was connected likewise to the liver, by a band stretched between these two organs."[†] In an analogous instance of visceral extroversion, Haan[‡] found the surface of the heart connected to the umbilical cord, by a thick thread of plastic or fibrinous pseudo-membrane.

Various pathologists, as Morgagni,[§] Penada,[‖] Tiedemann,[¶] Beclard,[**] and Duges,[††] have attributed a number of the most marked malformations of the head and upper part of the body to the destructive effects of hydrocephalus in the embryo. Though assuredly this doctrine has been carried far beyond its just limits by some of the authors here alluded to, there is still, however, as we believe, much reason to suppose that one or two varieties of anencephalous malformations are truly referrible to the purely physical effects of hydrocephalic inflammation and effusion.

On other occasions, I have endeavoured to trace the production of some additional varieties of malformation to an inflammatory origin. Thus, in consonance with the doctrines of Geoffroy St Hilaire, I have endeavoured to show that morbid inflammatory adhesions sometimes occur between the internal surface of the amnion, and the head, and various parts the body of the embryo;[‡‡] and I have at the same time referred to numerous cases[§§] in which these adhesions seemed to me to have proved the proximate cause of different varieties of malformation by displacement and arrestment of development in the fœtus,—such as certain forms of extroversion of the encephalic, thoracic, and abdominal viscera, some defective conjunctions in the median line of the face, trunk, and spine, atrophy or defective development of one-half of the body, or of particular limbs, disfigurements of the face and surface of the body, &c. I have elsewhere,* also, endeavoured to trace to the inflammatory effusion of coagulable lymph upon the cutaneous surface of the fœtus, the occurrence of certain mechanical mutilations of its limbs, produced by the constriction and contraction around them of bands or cords of false membrane, formed by the effused lymph. I have in my possession a preparation of a malformed fœtus of about the fourteenth week, in which a similar inflammatory effusion exists on different parts of the surface of the body, and has firmly united one of the hands to the corresponding cheek of the embryo.

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[*] Loc. cit. p. 25, Pl. iii. fig A. B.

[†] Breschet, loc. cit. p. 26, Pl. iii. fig 1, 2 and 3. Possibly the strong adhesions of the heart to the pleural surface of the diaphragm and of the left lung, found by the same author, in a case of congenital absence of the pericardium, may have been the result of intra-uterine inflammation. See Repertoire, Vol. i. p. 67, Pl. v.

[‡] Medic. Jahrbucher des Ost. Staates, Bd. v. s. 68

[§] De Sedibus et Causis Morborum, Cap. xii. 5—8, and xlviii. 50.

[‖] Saggio d'Osservazioni e' Memoria, (Padova, 1793,) Tom. ii. p. 56.

[¶] Zeitschrift für Physiologie, Bd. iii. s. 86.

[**] Bulletins de la Facultè de Med. (1817), p. 499.

[††] Revue Medicale (1827), Tom. iv. p. 428.

[‡‡] Edinburgh Med. and Surg. Journal, Vol. xlv. p. 307.

[§§] For some additional cases see Gooch's Midwifery, by Skinner, p. 91; Medico-Chirurg. Transactions of London, Vol. ix. p. 433; and St Hilaire's Histoire des Anomalies, Tome ii. p. 266—289.

The happy idea that was first suggested by the master mind of Harvey, relative to certain malformations consisting *not* in the *substitution* of an entirely new and anomalous type of structure in the malformed part, but only in the simple *permanence* of some of its transitory fœtal types, has been reduced, within the last thirty years, by the able investigations and labours of Wolff, Autenreith, Meckel, St Hilaire, and others, into one of the most certain and comprehensive, and at the same time one of the most beautiful laws in teratological anatomy. For our own part we entertain little doubt that physiologists will ere long be enabled to proceed with confidence one step further in investigating and generalizing the causes of the production of some of those malformations that are at present attributed, in accordance with the above principle, to deficient or arrested development merely, inasmuch as they will feel themselves entitled to trace, in a certain number of cases at least, the state itself of impeded development to the anterior influence of different inflammatory and other casual pathological conditions of the early embryo. It likewise appears to us probable that a limited series of those malformations that are now generally looked upon as the decided results of arrested development may come again to be regarded, as they were formerly, not as instances of absolute want of development of the defective part, but as cases in which this part had been, in the first instance, more or less fully evolved, and then subsequently destroyed by morbid action.

In prosecuting the study of malformations in reference to the above questions relative to the mode of their production, there appear to us to be several points highly worthy of consideration, which have not, we think, been hitherto sufficiently attended to in the inquiry; and if some of these points were once fully and satisfactorily established, they would certainly go far to remove several of the more prominent difficulties connected with this investigation. Thus, in endeavouring to trace the origin of different malformations to pathological conditions of the fœtus, we ought, as it appears to us, always to hold prominently in view the fact, that large divisions of the body and complete systems of the organs of

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* Dublin Medical Journal, Vol. x. p. 220.

the future individual, are represented by limited segments and small points in the organization of the early embryo. Hence, to speak rather paradoxically, inflammatory and other diseased actions in early embryonic life, may be very *limited* in their actual extent, and yet be very *extensive* in their actual results. If, for example, the minute anterior fold of the germinal membrane happened to become, during the first stages of development, the seat of any destructive morbid action, this action might in reality be confined to a very small extent of structure, and yet lead to what would afterwards appear as great effects when the other parts of the body came ultimately to be fully evolved. In this way some even of the most marked cases of acephalous monstrosity may, we believe, be produced by a morbid action that is originally strictly confined to organic structures of only one or two lines in absolute extent. The anatomical structures also of the early embryo are all so simple and homogeneous in their nature, that any morbid actions that may arise in them will not probably be limited in their extension and effects, as they are in the adult, by existing differences in the pathological properties of the component tissues of the affected part; while again, in addition to their limited scale and homogeneous character, the softness and fragility of these same embryonic structures, and the frequent dependence of a considerable segment of them upon the integrity of a single vessel, will all contribute to render a small amount of morbid action or mechanical injury capable of producing a great and destructive local effect. At the same time, however, that such *local* destruction of parts, from the same amount of diseased action, may be very much greater in the embryo than in the adult, it seems, on the other hand, equally certain that the *general* effect of this diseased action and destruction of parts is always infinitely less upon the former than upon the latter,—as respects either the life of the individual or the integrity of the other component parts and organs of the body. This last point appears to us to be one of much moment in the present investigation, and, in conclusion, we will adduce one or two remarks as comments upon it.

The labours during the present century of Meckel, Serres, and various other physiologists have, in accordance with the doctrine of unity of organization, shown, that at different stages in the course of development, in the embryos of man and of the higher animals, their individual organs pass through a series of transitory changes or types of structure, in each of which they bear a greater or less resemblance to some of the permanent types of structure presented by the same organs in some of the inferior classes of animals. In this manner the complete history of the embryonic development of any organ in the higher animals, comes to correspond more or less exactly with the history of the development of the same organ in the animal kingdom at large,—or, in other words, its embryonic and comparative anatomy are, in most of their great outlines, repetitions of one another. But, besides this resemblance in mere anatomical structure between the early embryos of the higher and the permanent normal states of the lower animals, we are further inclined to maintain that there exists between them an equally strong analogy with respect to some peculiarities in the *pathological* laws that preside over their organization.

We know it to be a principle generally admitted in comparative pathology,* that, in proportion as an animal is more simple in its structure, its power of repairing and restoring lost parts is the greater, and, on the contrary, that this power diminishes nearly in an inverse ratio with the original or acquired complexity of its organization. Thus, while a mere segment of a Polype or Planaria will reproduce a perfect animal, other animals higher in the scale of life, as the Mollusca, Crustacea and Batrachian reptiles, have only the power of reproducing individual, though still complex parts, as an eye, a lower jaw, or an extremity; whilst in man, again, in his adult state, this property of reproduction of lost parts extends simply to the regeneration of single tissues, and, indeed, only to that of the more simple among these tissues. The larvæ of Insects and of the Arachnida have the power of regenerating a lost antenna or limb; but the very same animals, after they become more perfectly developed, and, consequently, have acquired a more complex organization, exhibit no such property of reproduction. Now, during the first stages of development, the human embryo and that of the higher animals, approaches in simplicity and homogeneity of anatomical structure to the normal condition of the lower tribes of animal beings, and, consequently, also it will be found, (as we believe,) to present at the same period a degree of analogy in its power of suffering and repairing injuries. And, as this power, as we have already seen, diminishes with the complexity, and increases with the simplicity of animal organizations, so in the human and other embryos, the *earlier* that any morbid change, mutilation, or destruction of parts takes place, the more probable will it be, *first*, that it will not prove subversive of life, and, *secondly*, that nature will attempt some process of reparation.

The analogy to which we here advert may, in some respect, we think, explain to us the possibility of the fact already alluded to, and which we have so often occasion to remark in the study of monstrosities, namely, that when one organ or set of organs in the embryo, or even a large and entire segment of its body is arrested in its development, or destroyed by disease, it frequently exerts no deleterious influence upon the general life of the embryo, or upon the development of the other remaining parts and organs of its body. The same analogy also may enable us to admit what we believe to take place in some cases in the human embryo,—a certain, though comparatively very imperfect attempt at the regeneration of parts that have been destroyed. I have been able, as I conceive, to trace marks of such regeneration in several cases of the so-called spontaneous amputation of the limbs of the fœtus; and there is reason to believe that it may take place in other parts and under other circumstances; but it probably occurs, in the human embryo, only when the original mutilation is effected at a very early period of embryonic life.

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* We need only refer to the well-known experiments and papers of Spallanzani, Bonnet, Trembley, Reaumur, Baumgaertner, Heineken, Müller, Duges, Johnston, Allen Thomson, &c.

It is almost unnecessary to add, that if, in the study of monstrosities by deficiency, we admit in this way of the possibility of a partial regeneration of lost parts, we will necessarily, from the presence of such reproductions, have an additional difficulty in distinguishing between those malformations that consist of an originally imperfect or impeded development, and those in which the defect was the result of a secondary destruction of the anormal structures in consequence of disease, or of injury.

Art. III.—*On the Effects of Lesion of the Trunk of the Ganglionic System of Nerves in the Neck upon the Eyeball and its Appendages.* By John Reid, M.D., Fellow of the Royal College of Physicians, Edinburgh, Lecturer on the Institutes of Medicine, President of the Anatomical Society, &c. &c.

In a former communication in this Journal (for January 1838, p. 132,) I stated that I had frequently verified the observations of Petit and others, that when the *vagus* is injured in the neck in those animals in which the sympathetic is combined with the *vagus*, as in the dog,—that the *conjunctiva* becomes inflamed, the pupil contracts, and the eyelids are somewhat more closely approximated to each other. At that time I suggested that the contracted pupil and partially closed eyelids might probably depend upon the impatience of light which sometimes accompanies inflammation of the *conjunctiva*. I have since attended more carefully to this subject, and during the last summer satisfied myself that the contraction of the pupil, the projection of the cartilaginous membrane, or third eyelid, situated at the inner angle of the eye over the cornea, and the partial approximation of the eyelids to each other, take place immediately after the injury of the sympathetic, and before the inflammation of the *conjunctiva* presents itself, and that they continue after it has disappeared. I shall here detail a few of the experiments which I have made in elucidation of this point.

Exp. I. The *nervus vagus* and sympathetic were cut on the left side in a small terrier, and instantly the pupil of the eye became considerably diminished in size, and the cartilaginous membrane at the inner angle of the eye was forced over the internal margin of the *cornea*. A quarter of an hour after the division of the nerves, the *conjunctiva* of the left eye appeared more vascular than that of the right, and the *cornea* was perhaps a little dimmer. There was also some increased secretion of tears from the left eye, and the condition of the pupil and third eyelid remained as before.—Twenty-four hours. The *conjunctiva* of left eye was vascular and covered with a thick tenacious mucus, and the appearance of the *iris* and the third eyelid was the same as immediately after the division of the nerves. Some slight vascularity of *conjunctiva* of right eye, and some increased secretion of mucus, but there was no apparent change upon the pupil and third eyelid.—Third day. The *cornea* of left eye was dim, and the *conjunctiva* very vascular, and covered with much tenacious mucus. The *conjunctiva* of right eye was somewhat vascular, and covered with a small quantity of mucus.—Seventh day. The *cornea* of left eye was less dim, and there was less inflammation of *conjunctiva*, but it was still covered by a considerable quantity of puriform mucus. The pupil was still contracted, and the cartilaginous membrane projected over the *cornea*. The animal was now made the subject of another experiment. In this and in several other experiments which I have made, with a similar view, I was assisted by my friend Dr Staberoh of Berlin.

Exp. II. The *vagus* and sympathetic were cut across on one side, and a portion removed in a middle-sized cocker dog, after the exact similarity of the two eyes had been ascertained. Immediately after the section of the nerves, the pupil became contracted, the third eyelid projected over the inner edge of the *cornea*, the eyeball was apparently placed deeper in the socket, and rolled inwards, and the eyelids partially closed. At this time there was no perceptible redness of the *conjunctiva*. Ten minutes after the section of the nerves the pupil and eyelids remained in the same state, and there was no vascularity of the *conjunctiva*.—Twenty-four hours. The *conjunctiva* of the side operated upon was very vascular with increased secretion of tears; the *cornea* was, however, clear, and there was no inflammation observable in the deeper parts of the eyeball. The opposite eye had undergone no change from the natural condition.—Forty-eight hours. No perceptible change since yesterday.—Fifth day. Rather less vascularity of the *conjunctiva* of the side operated upon, and it was partially covered with some puriform mucus. The other appearances remained as before.—Sixth day. Less vascularity of *conjunctiva*, no other perceptible change.—Eighth day. Vascularity of *conjunctiva* nearly gone, the pupil is apparently less contracted, and the third eyelid projects decidedly less over the *cornea.*—Tenth day. There are still some remains of conjunctival inflammation. The pupil is still very perceptibly smaller than that of the sound eye; the cartilaginous membrane projects less over the *cornea*, and the eyelids are less approximated, though evidently closer to each other than in the sound eye.—Third week. Scarcely any traces of redness on the *conjunctiva;* the third eyelid still projects forwards, but it does not now encroach on the *cornea;* other appearances remain as before.—Five weeks. Redness of *conjunctiva* entirely gone, but other appearances remain unchanged.—Two months. The pupil of the eye of the side operated on is still very decidedly less than that of the opposite side, and the eyelids are evidently somewhat more approximated. The pupil was not, however, motionless, but it has continued to contract and dilate when exposed to a stronger or feebler light. The animal was now killed by a dose of prussic acid, and it was observed that while expiring, the pupils of both eyes were much dilated and became of equal size.

Exp. III. The left superior cervical ganglion of the sympathetic was removed in a dog in which the common carotid of that side had been previously secured to prevent hemorrhage. Great care was taken to avoid injury of the *nervus vagus.* The lower half of the ganglion was at first only removed, and this was immediately followed by contraction of the pupil, the projection of the third eyelid over the inner edge of the *cornea*, and the other appearances remarked in the previous experiment. One minute after this the whole of ganglion was removed without any apparent increase of the effects previously produced.—Twenty-four hours. Scarcely any increased redness of left *conjunctiva*, but there is some slight increased secretion of mucus. Pupil as yesterday. The eye remained nearly in the same state during the fortnight it was allowed to live. It ate freely, was quite active, and never showed any tendency to stupor.

In the dog, as I have already remarked, it is impossible to cut the *nervus vagus* in the middle of the neck without also dividing the trunk of the sympathetic. In the cat, however, though these two nerves lie in the same sheath, yet by a little care they can be easily separated from each other opposite the thyroid cartilage; and in the rabbit they have nearly the same relation to each other as in the human species. The cat and the rabbit consequently furnish an opportunity of experimenting upon these nerves singly.

Exp. IV. The sheath of the right carotid was exposed high in the neck in a kitten, and the sympathetic was then cautiously separated from the *vagus* without injuring the latter. When the sympathetic was compressed with a moderate force, the right pupil began to contract gradually, and became much smaller than that of the left eye; and it again resumed its former size on removing the pressure.* A portion of the right sympathetic was now removed, and the pupil again contracted slowly, and remained permanently smaller than that of the left eye; the cartilaginous membrane was pushed considerably over the anterior surface of the cornea, and the eyelids were partially approximated to each other.—Twenty-four hours. No distinct redness of *conjunctiva*. Condition of right eye the same as yesterday, and the pupil, though constantly smaller than the left, contracts and dilates within certain limits on exposure to a stronger or feebler light. The animal was lively. It died seven days after the division of the nerve. At the time of its death no distinct redness of the *conjunctiva* had presented itself, and the eye had the same appearance as the day after the operation.

Exp. V. The left sympathetic was cautiously separated from the *vagus* in the neck of a full-grown cat, and cut across. The iris immediately contracted slowly, and gradually, and soon presented a marked contrast to the right pupil, and the third eyelid was pushed over the inner surface of the *cornea*. The right *vagus* was now exposed, separated from the sympathetic, and divided without injuring the latter. This was followed by no change upon the right eye. The right sympathetic was now divided, and the same phenomena presented themselves as in the left eye. Dr Alison was present at this experiment. No distinct redness afterwards presented itself in the *conjunctiva* of either eye. When the animal was killed three weeks after division of the nerves, the cartilaginous membranes at the inner angles of the eye, though more distinctly visible than usual, did not project over the *cornea*; the pupils were exactly similar, and appeared to have nearly recovered their usual size. As in this experiment, however, both sympathetics had been cut, we could not judge of the effects of the operation upon the pupil as in the cases where the sympathetic was divided on one side only, for then the sound eye served as a standard of comparison.

Exp, VI. I removed a portion of the right sympathetic from the neck of a full-grown cat in the presence of Dr Monro and Mr Mackenzie. On cutting the nerve across, the pupil was instantly seen to contract slowly and gradually, and soon presented a marked contrast with that of the opposite side. The cartilaginous membrane at the same time gradually encroached upon the surface of the inner part of the *cornea*, the eyeball appeared deeper, and the eyelids more approximated than those of the opposite eye. A month after section of the nerve, the size of the pupil still presented a very striking difference from that of the left eye; and the cartilaginous membrane projected more than that of the opposite side, though it no longer encroached upon the *cornea*. The animal never lost its activity.[*]

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* This experiment of producing contraction of the pupil by compressing the trunk of the sympathetic in the neck, I have repeated with success in other cases not detailed here.

Exp. VII. In one rabbit the trunk of the sympathetic was first divided on one side of the neck, and a portion removed; and a few days after, the same operation was repeated on the opposite side. In other seven rabbits the superior ganglion of the sympathetic or a large portion of the trunk of the nerve was removed on one side without tying or injuring any of the large blood-vessels or any other nerve, and in two of these the same operation was repeated on the opposite side. In one of these only was there any change observed upon the iris, and no decided increased redness of the *conjunctiva* presented itself. In one of these animals it was remarked that the eyelids of the side on which the superior ganglion of the sympathetic had been removed, was less apart than on the opposite eye; but whether this was the effect of the removal of the ganglion, or of some slight injury received during the operation, we cannot at present pretend to determine. From these experiments it would appear that in rabbits the superior ganglion of the sympathetic, and a considerable portion of the trunk of that nerve as it lies in the neck, may be generally removed without effecting any change upon the iris; while the compression or section of the trunk of the sympathetic in the neck in dogs and cats is instantly followed by contraction of the pupil, the forcing of the cartilaginous membrane over the inner part of the anterior surface of the eyeball, the retraction of the eyeball deeper into the socket, and a slight approximation of the eyelids. In dogs this also is followed,—sometimes after a very few minutes, but generally after a longer interval,—by inflammation of the *conjunctiva*, which is occasionally so severe that this membrane presents an almost uniform redness, and is covered by puriform mucus; and the cornea becomes dim. As far as I have been able to observe this, inflammation is confined to the *conjunctiva*. To judge from the limited number of experiments which I have yet made upon cats and rabbits, the inflammation of the *conjunctiva* in the former is trifling, if present at all; and in the latter it is entirely absent. I was at first inclined to believe that the outward projection of the third eyelid, for in the dog and cat it has no muscles attached to it, was dependent upon the rolling inwards of the eyeball; but subsequent observations have nearly satisfied me that this depends upon the *retrahens oculi* muscle drawing the eyeball deeper into the orbit, by which the fat is pressed forwards, and the third eyelid pushed over the anterior surface of the eyeball. This would also explain the approximation of the eyelids. I find it impossible at present to give any thing like a plausible explanation of the effects of injury of the sympathetic upon the eyeball and its appendages, and the cause of their dissimilarity in different animals. It is evident, however, that this is to be sought for in the connection of the branches of the sympathetic with the encephalic nerves of the orbit, and especially with the sixth pair, and those branches forming the ciliary nerves. I intend at my earliest opportunity to endeavour, by extensive minute dissections of the ascending branches of the superior sympathetic ganglion in various Mammalia, to give some probable solution of this question. We may then be able to judge whether an injury of the cervical portion of the sympathetic in man, such as may possibly occur in certain diseases and operations on the neck, would be followed by contractions of the iris and inflammation of the *conjunctiva*. In a case described in the Medical Gazette,[*] where the right carotid, the vagus and surrounding parts are described as being enveloped in a large morbid tumour, and where, consequently, the sympathetic could hardly be supposed to escape, the pupil of that side is described as becoming smaller during the course of the disease.

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[*] In a cat on which I assisted Mr Little to repeat this experiment, the pupil was nearly natural a month after a portion of the sympathetic and *par vagum* on one side were removed.

This contracted state of the pupil, consequent upon lesion of the sympathetic in the neck, is not noticed in the experiments of Cruickshank,[†] Arnemann,[‡] Mayer of Bonn,[§] and Brachet,[||] though all these authors describe its effects upon the *conjunctiva*. Indeed, Arnemann expressly states, "that he has not observed the changes upon the pupil which Molinelli has remarked after ligature of the eighth nerve"[¶]; and Brachet, in relating his first experiment, where the trunk of the sympathetic was divided in the neck of the dog for the purpose of observing its effects on the eye, makes the following observation;—"L'iris n'en a reçu aucune influence marquée; il a continué de se contracter suivant la vivacité de la lumière: cette remarque ayant été commune à toutes les experiences, je ne la reproduirai pas." Petit[**] remarked this contraction of the pupil in some of his experiments; but his observations would lead us to believe that it was a subsequent and not an immediate effect, and could not enable us to decide whether or not it was dependent upon the inflammation of the *conjunctiva.* In Experiment I. of the second series of his two sets of experiments,[*] the right vagus was cut on the 18th September; and on the 19th, he remarked, among other changes on the eye of that side, that the pupil was less. The left vagus of the same animal was afterwards divided, (Experiment II. p. 11,) and in a quarter of an hour he observed the cornea flattened, and the pupil contracted. In Experiment III. and IV. he observed the pupil to be contracted one hour after section of the nerves. In Experiment V. he made this curious observation, that when the nerves were cut on both sides, dilatation of the pupil followed, and more in the right eye than in the left. This animal, it is worthy of remark, suffered much from dyspnœa, and died in twelve hours. In the numerous experiments which I have made upon the effects of section of the vagi, I never observed any thing similar to this; on the contrary, the pupils always became contracted.

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[*] September 29, 1838, p. 16.

[†] Medical Facts and Observations, Vol. vii. p. 156, or Phil. Trans, 1795, Part I.

[‡] Versuche über die Regeneration der Nerven, S. 69, 85–6–7–9, 94–6–7–9, 102. Göttingen, 1787.

[§] Journal der Chirurgie von Gräefe und Walther, Zehnter Band, S. 418.

[||] Recherches Experimentales sur les Fonction du Systeme Nerveux Ganglionaire, Chap. ix. Experiment 150–1–2, &c.

[¶] Oper. cit. s. 96.

[**] Memoire dans lequel il est demontré que les Nerfs Intercostaux fournissent des rameaux qui portent les esprits dans les yeux. Histoire de l'Academie Royale, 1727

Molinelli[†] relates five experiments upon dogs, in which he watched the effects of ligature of the vagus and sympathetic upon the eye. In one experiment he informs us, (p. 281,) that a little after the left vagus was tied, the *conjunctiva* of the left eye became red, and the cartilaginous membrane at the inner angle of the eye projected over the cornea. On the seventeenth day after the operation, he observed that the pupil of that eye was diminished in size. In Experiment III. (284) the left vagus was tied with a double ligature on the 14th January; and on the 30th it was remarked that the pupil of the left eye was twice as small as the right, and that the eyeball seemed depressed. In Experiment IV. he mentions a change of colour in the iris; but there is nothing said about the diminution of the pupil. Dupuy[‡] in two of his experiments mentions this contraction of the pupil. In one experiment (Oper. cit. Premier Fait, p. 343,) he remarked that the pupil became contracted immediately after the superior ganglion of the sympathetic had been extirpated. His words are these,—"Aussitôt après l'operation, l'œil de ce côté parut plus enfoncé dans l'orbite, les paupières étaient tumifiées, la membrane clignotante se portait en avant du globe occulaire la pupille se ressera." In a subsequent experiment, (Troisième Fait, p. 347,) the operation was performed on the 26th April; and on the 10th May he observed that the pupil was contracted. Though I have occasionally observed very severe inflammation of the *conjunctiva* follow this operation in dogs, yet I have never seen it proceed to the disorganization of the eyeball. In one of Arnemann's experiments it appears to have produced ulceration of the cornea.[§] In two of Mayer's experiments upon rabbits, where the vagus and sympathetic were not only enclosed in ligatures, but the common carotid was also tied, inflammation of the cornea occurred, and this in one case was followed by ulceration, and in the other by staphyloma, and the effusion of a layer of lymph upon the anterior surface of the iris, obliterating the pupil.[*] Brachet relates several experiments to show that injury of the sympathetic or destruction of its superior cervical ganglion is attended by great vascular congestion of the anterior and middle lobes of the brain, producing drowsiness and stupor.[†] The experiments which I have made on this point do not by any means confirm those of M. Brachet. As the fact, if correct, is one of great importance, and ought to be very carefully investigated, I shall reserve the consideration of this and some of the other questions connected with the lesion of the cervical portion of the sympathetic, and more especially the length of time the contracted state of the iris continues after a portion of the nerve has been removed, until a future opportunity.

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[*] Oper. cit. p. 10.

[†] Comment. Bononiensi, Tom. iii. 1755, p. 280.

[‡] Journal de Médecine, Chirurgie, &c. December 1816, Tome xxxvii. p. 340.

[§] Oper. cit. Acht und Sechzigster Versuch, S. 69.

ART. IV.—*Analytical Essay on Irregular and Aggravated forms of Hysteria.* By THOMAS LAYCOCK, House Surgeon to the York County Hospital. (Continued from Volume 50, p. 356).

1. THE phenomena of hysteria remaining for review are those in which consciousness is directly involved; namely, coma, delirium, spectral illusions, and somnambulism. Before I can enter fully into their consideration, it will be necessary to make some preliminary remarks on the nature of consciousness; and as these cannot but have a continual reference to the functions of the nervous system, and as also it will be necessary to review some points in the physiology of the latter, previously to instituting such a general summary of facts and inferences as may lead us to some more precise information respecting the nature and seat of those diseases I have been investigating, I think it will be better to commence this review at once, and conduct it with a special regard to the objects to be attained.

2. As, in the course of this inquiry, I shall unavoidably be led into various unsatisfactory hypotheses and speculations, I must, at the outset, solicit the indulgence of the reader, and request that he will peruse them in the same feeling with which they are written; namely, an anxious desire to ascertain the causes and relations of the various phenomena displayed in health and disease.

[†] Oper. cit. Experiment 17 and 18.

[‡] Oper. cit. Experiment 155-7-9 and 160.

With such a feeling he will be much more careful to ascertain the amount of truth than of error contained in them.

3. Perhaps no one subject has engaged the attention of man so much as the nature of his own mind; and, consequently, upon no other subject has so much been said and written. It would be altogether foreign to my plan to review the various theories which have been adduced respecting life, organization, the nature of the Deity, and a future state. They may, however, be cursorily noticed, and made available in limiting the points of inquiry to what is really useful.

4. Nothing strikes the mind so forcibly after a perusal of these various theories, as the similarity of all, whether they be those extant at an era long antecedent to the earliest Grecian, as recorded in oriental literature,—the profound disquisitions of Pythagoras, Plato, and Aristotle, the metaphysical commentaries of the Roman philosophers and schoolmen of the middle ages, or the hypotheses of the moderns, founded on gravitating, electric, magnetic, and attractive and repulsive forces—they all present more or less prominently three essentials, namely, intelligence, force, and inert matter.

5. These essentials, under various guises, have also entered into the popular metaphysics of every age. The early Greek writers derived their opinions from the east; and the moderns are equally indebted to the same source through the Holy Scriptures, the language of which is imbued with the philosophy of the eras at which they were severally written. St Paul, in that celebrated passage in his sermon to the Athenians, "For in Him we live, and move, and have our being; as certain also of your own poets have said," embodied the essence of the Platonic philosophy; the true meaning of the passage in the original being, that from the supreme mind or intelligence, or universal soul, we derive consciousness, force, and animal life.[*] So Aristotle in his treatise Περὶ Κόσμου, writing of the cause which keeps the universe together, observes, that, according to an ancient tradition which has been transmitted to every tribe of the human race, all things have proceeded from God, and are every moment dependent upon him for their continuance and mode of existence.[†]

6. This opinion, taught by Plato and Epicharmus, was derived from the Védânti School of India, the fundamental tenet of which was, that solidity, impenetrability, and extended figure depended upon a continued effort of the Divine energy; and consequently the secondary qualities of matter also, derived from these the pri-

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[*] Ἐν αὐτῷ γὰρ ζῶμεν, καί κινούμεθα, καί ἐσμεν: Τοῦ γὰρ καὶ γένος ἐσμέν.

[†] An Inquiry into the Opinions, ancient and modern, concerning Life and Organization, by J. Barclay, M. D. Edinburgh, 1822. P. 430.

mary qualities.[*] In modern days Sir I. Newton supported the opinion, that gravity was the primary force of the universe, and dependent upon a continued volition of the Creator. Such also was the opinion of Dr Clarke;[†] and Professor Stewart advocated very similar doctrine.[‡]

7. As the cause of vital and psychical phenomena has been confounded with the phenomena themselves, so the cause of cosmological phenomena has been confounded with its effects; and philosophers have erected that into a deity which is but an instrument of the Supreme mind. It was thus that the philosophers and people of the East came to worship fire; and thus Hippocrates, in expressing not only his own sentiments, but those of Heraclitus and many of the stoics, says, "It appears to me that what is called heat (the elemental fire) is immortal and omniscient; that, it sees, and hears, and knows, all things, present, and to come."[§] Doubtless much of the figurative language of the Old Testament has the same Eastern origin.

8. Heat also has been considered the animating principle. Cicero quotes Lucilius Balbus as maintaining, that whatever lives, be it animal or plant, it lives by its *calor inclusus*.[||] Harvey attributes life to an animating principle in the blood;—a *calidum innatum*, totally different in its operations from ordinary heat, and analogous to the element of the stars.[¶]

9. According to Diogenes Laertius, Anaxagoras the Clazomenian was the first who considered mind as well as matter to be a primary independent principle; commencing his work with this sublime observation: "All things at first existed together in a state of confusion: Mind then came and arranged them (διεκοσμησε.)" He maintained also that mind was the cause of motion; "νοῦν μὲν ἀρχὴν κινησεως."[**] Analogous but more specific are the doctrines of that ancient and remarkable system of cosmogony written by Moses, and which has been ridiculed by pretenders to philosophy, because they had not the grasp of mind sufficiently large to comprehend it. Moses declares, that "God said let there be light, and there was light." The term in the original translated light does not mean the light of the sun, or of a luminous body simply, but rather the cause or matter of both light and heat; cor-

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[*] D. Stewart, Philosophy of the Human Mind. 2d edition, Vol. ii. Note B.

[†] "All those effects which we commonly say are the effects of the natural powers of matter and laws of motion, of gravitation, attraction and the like, are indeed (if we will speak strictly and properly) the effects of God acting upon matter continually and every moment," &c. Clarke's Works, fol. ed. ii. p. 698.

[‡] "Matter, therefore, is not a thing which has a separate and independent existence, but an *effect* which is continued by the constant agency of Divine Power." Philosophy of Human Mind, 2d ed. ii. p. 188.

[§] Barclay, Op. cit. p. 82.

[||] De Natura Deor. lib. ii. § 9, 10, 15.

[¶] De Generat. Animal. Exercit. lxx. Lond. 1651.

[**] Barclay, op. cit. p. 37.

responding, in fact, to the fire of the ancients, and the caloric of the moderns;[*] which latter is now considered by many as nothing more than a modification of the primary forces of matter, or of those powers of repulsion which Boscovich attaches to unextended elements to constitute matter of itself.[†]

10. The theories of Aristotle and Leibnitz are very similar, and may be easily resolved into the same general principles as the preceding. Even La Place's cosmological theory, so far as it goes, corresponds almost exactly with the Mosaic account. See Edin. Rev, Vol. lxxvii. p. 297.[‡]

11. It is a remarkable fact in the history of the human mind, that the opinions of the wisest men of all ages, respecting cosmogony and life, have such a striking general coincidence. All the cosmological theories that have been hitherto produced differ only in the terms in which they are announced, in their comprehensiveness, or their illustrations. I believe it would be utterly impossible for the finest genius to originate a hypothesis entirely novel.[§] The three essentials already mentioned must constitute the basis of any theory of mind.

12. It is to be regretted that speculations respecting the immortality of the soul are still mixed up with the physiology of mind. The knowledge of the existence of God; of ourselves and of matter; of a future state; of right and wrong; and of moral liberty, are

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[*] Dr Adam Clarke in Commentary.

[†] Daubeny on the Atomic Theory, 8vo. Exley's New Theory of Physics, 8vo. 1829.

[‡] The French neo-platonic school holds doctrines nearly resembling those of Leibnitz; there is little more than a difference of terms. De Lamartine, the most popular living poet of France, is of this school; and in its spirit he thus writes of the atoms seen in a sunbeam.

> "Pourtant, chaque atome est un être!
> Chaque globule d'air est un monde habité!
> Chaque monde y regit d'autres mondes peutêtre,
> Pour qui l'éclair qui passe est une éternité!
> Dans leur lueur de temps, dans leur goutte d'espace;
> Ils ont leurs jours, leurs nuits, leurs destins, et leur place;
> La pensée et la vie y circulent à flot;
> Et pendant que notre œil se perd dans ces extases,
> Des milliers d'univers ont accompli leurs phases
> Entre la pensée et la mot!"
>
> "*Jocelyn*, an Episode," 12mo, 1838, Tom. i. p. 196.

[§] This resemblance is kept up even in the details. Thus when Dr Elliotson, in ridicule of the doctrine that the soul is an independent entity, asks, "where the depôt of souls is; how they learn when a youth has impregnated an ovarian vesicle; and how they fly and get into it," &c. (Physiology, 5th ed. p. 41,) he merely resuscitates some Lucretian banter:—

> "Denique connubia ad Veneris, partusque ferarum,
> Esse animas præsto, deridiculum esse videtur;
> Exspectare immortaleis mortalia membra
> Innumero numero, certareque præproperantur
> Inter se, quæ prima, potissimaque insinuetur."
>
> *Lucret.* lib. iii. 777.

inherent in our nature: and if they were not confirmed by revelation, ought no more to be questioned than mathematical truths. No inductive arguments can render our perceptions of them clearer, or throw a stronger light on these abstruse subjects.[*] Nor would I have entered at all upon the consideration of these, had it not been absolutely necessary to understand clearly the point at which we may safely commence our reasonings about things as they are.

13. It appears to me the more reasonable and philosophical to assume, that there is an agency in man (and for any thing we know in other animals,) distinct from matter and organization, but dependent upon organization for the due display of its effects. The consideration of its essence, its origin, or its future state, is in no degree connected with the question. Its nature appears to me as incomprehensible as that of the Deity. I find, however, that mind perceives the existence of matter by its qualities, which are dependent on force; and I am compelled to conclude, that force could not have existed without mind;[†] that finite minds could not perceive matter without force; that matter without mind and force would be inert, or essentially nothing.

14. Mind is that which originates motion or wills; perceives the qualities of matter; and compares the perceptions or thinks.[‡] What the infinite mind is to the universe, a finite mind is (physically) to its corporeal organs. "Princeps ille Deus, qui omnem hunc mundum regit, sicut animus humanus id corpus cui præpositus est."[§] There is this remarkable difference, namely, that the Supreme Mind originates force, while the finite only transfers it;[‖] or, in other words, excites motion; the former originates the qualities of matter, the latter can only feel their effects on organized matter; the Divine Mind thought before matter existed, we think with our brains.

15. In assuming the power to will and perceive changes in matter as the efficient cause of mind, in the popular sense of the term, I am quite willing to concede that it is not necessary that the phy-

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[*] Dr Reid advises us "to take our notions of the qualities of body from the testimony of our senses, with the Peripatetics; and our notions of our sensations from the testimony of consciousness with the Cartesians."—Inquiry, &c. Chap. vii. This eclectic spirit of inquiry has always been the most successful.

[†] "I agree with Sir Isaac Newton, that power without substance is inconceivable." —Reid on the Intellectual Powers, Essay ii. Chap. 14.

[‡] "Mind, we say, is that which feels, which thinks, which has the power of beginning motion." D. Stewart on the Active and Moral Powers. Edin. 1828, Vol. i. Notes, p. 401.

[§] Cicero, Somnium Scip. § iii.

[‖] "Yet neither by life nor the subject of it, do I mean a principle of motion; the universal stock of motion as that of matter being neither increased nor diminished, but only transferred; but I mean a certain power to determine the manner of its being transferred," &c.—Grew, Cosmologia Sacra, Fol. 1695, p. 65.

siologist should decide whether this efficient cause be independent of the brain or not. With regard to myself after duly considering the subject, I feel certain it will be; but in this world we can know nothing of it, except as manifested by its effects on the brain; and through the brain on the nervous system. By these effects, and by our consciousness, we are assured of its existence. By our own consciousness, because we are as sensible of the power to will and perceive, as we are of the action of light; and it would be just as rational to deny the existence of the one as of the other. By its effects, because motion plainly follows volition, or, in the words of Locke, "sensation convinces us that there are solid extended substances, and reflection that there are thinking ones; experience assures us of the existence of such beings, and that the one has power to move body by impulse, and the other by thought."* In short, the will exerts a force on organized matter—the brain, in exciting motion, as plainly as the force of matter acts on the nerves in exciting sensation. As any attempt to explain the nature of these forces would only be to reason in a circle, I rest content with having ascertained their existence. Their effects are the legitimate object of scientific research.

16. The most superficial observation has rendered it certain that the effects of these forces on the phenomena of life are manifested through a complicated apparatus. And certainly nothing has tended so much to retard the progress of psychological knowledge as the neglect of vital mechanics by those who have studied mental phenomena; while the conflicting theoretical details of metaphysicians, and the mistaken zeal of well-meaning philosophers, have combined to drive the physical inquirer from the field of psychology, and to set up a mode of investigation, which, prosecuted principally by metaphysical inquirers, was utterly insufficient, because directed to the elucidation of ethical philosophy, and limited to the objects of man's consciousness, or, in other words, to his own thoughts. The effects of external stimuli on the mind were altogether unnoticed, or only mentioned incidentally as belonging to the domain of the physician.† Even Locke scarcely ventured to refer to the brain and nervous system; but it is not a little curious that brain may be substituted for mind in numerous passages of his works. He speaks constantly of the mind as the organ, and of the will, and understanding or perception, as the agents. Professor Stewart overlooked the phenomena of vital mechanics, while Gall and his followers have paid too exclusive an attention to them as partially exhibited in the brain. In both these

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[*] Essay on the Human Understanding, Book II. chap. 23, § 28, 29.

[†] Metaphysicians too are bad observers. This Dugald Stewart plainly acknowledges and explains. (On the Human Mind, ch. vi. § vii.) And it is because young men are better observers than logicians that they are materialists.

instances we have been deprived of the benefit which would have resulted from a combined consideration of psychical and vital phenomena.

17. In general, the action of the molecules of matter on each other excites motion; but it is by the reaction of gaseous and solid matter that the greatest amount of force or impulse is developed. In solid matter, the particles are compelled to occupy less space by what has been called the force of cohesion; in gaseous matter they are supposed to be repelled from each other by a repulsive force, which is eliminated or set free whenever the gaseous matter becomes solid. This force (9,) stored up in the atmosphere may be considered the prime mover not only of those machines of the present day, which exemplify in so remarkable a manner the power of mind, but even of the vital mechanism which they mimic.* From the sensation which it excites when acting on a living body, it has been called heat, or the matter of heat. Separating the particles of water from each it produces steam, varying in power according to the amount of repulsive force or heat acting on the particles. If the supply of air be cut off from the furnace of the steam-engine, decomposition is arrested, heat is no longer evolved, and the motion of the whole machinery connected with the boiler is stopped. So if the atmosphere be excluded from the galvanic battery, decomposition ceases at the poles, gaseous matter is no longer evolved, the weight drops from the helix, and light cannot now be produced.

18. So too, we shall find that the amount of temperature and of capillary and muscular action required by animals have a distinct ratio to the consumption of atmospheric air (8); or, in other words, the respiratory apparatus will always have a magnitude proportionate to the activity of the vital movements of the individual.

19. It may also be stated as a principle applicable to all organisms, whether vegetable or animal, that an apparatus for the mutual action of solid and gaseous matters must constitute the basis of every individual organism.† In plants, as is well known, the leaves are the respiratory organs, and the roots the nutritive; corresponding in function to the stomach of animals, and indeed have been likened to a stomach turned inside out.

20. If we would obtain a large and definite knowledge of the action of force upon matter and intelligence, in exciting the phenomena of life and thought as displayed in man, we must examine the laws of its action as exhibited both in every living organism, and in the molecular changes of inorganic matter. A

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* "La sensibilité se rattache, peut-être, par quelques points essentiels aux causes et aux lois du mouvement, source générale et féconde de tous les phénomènes de l'univers."—Cabanis, Physique de l'Homme, Mem. ii. § iii.

† La vie est une suite de mouvemens qui s'executent en vertu des impressions reçues par les differens organes."—Cabanis, op. cit. Mem. i. § iii.

thousand circumstances assure us that between these last and the highest efforts of human intellect, there is a continuous chain of phenomena, although we have been unable to follow it link by link. These links are so continuous between certain vegetables, and animals of the lowest class, that naturalists have been unable to decide whether the organism should be placed in the animal or vegetable kingdoms. And even when there can be no doubt of the nature of the individual, circumstances still show forth the similarity of laws by which all organisms are governed. Thus in plants we find the male and female organs in the same individual constituting a true hermaphrodite; but in animals which have the male and female organs in one individual with the power of locomotion, the congress of two is required. Some animals, however, are without this power, as the acorn shell-fish, which consequently impregnates itself like plants, and is a true hermaphrodite.

22. This and numerous other illustrative instances show the close connection of all organic matter, and render it probable that no bio-molecular movements take place in animals of even the highest organization, which have not their counterpart in vegetables and animals of the lowest forms.

23. In the last mentioned there is no central nervous system, as in animals of a higher grade. The nutritive and respiratory functions are carried on by powers originating in, and connected with, a mechanism diffused through the tissues of the organism; so that a leaf, or a portion of a polypus or planaria, possesses, independently of the parent being, the essentials to continued vital action, namely, a respiratory and nutritive apparatus.

24. If we advance a step higher in the animal scale we find a distinct nervous system having a centre of action (a ganglion;) and just as a plant, so may an individual animal be really a congeries of individuals; each segment or ganglion with its dependent tissues having a power of maintaining a continued and independent existence when separated from the others. Illustrations of this fact are afforded by sections of some Annelida, as the Nereides and Naiades.[*]

25. Advancing in the scale of developement we find that, just as the diffused nervous system became dependent upon a central ganglion, so these various ganglia become dependent upon some one or two which have attained a developement superior to the rest, and which are essential to the integrity of the functions of

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[*] "As each segment of the *tænia* is complete in itself, and capable of independent existence, so each segment of the body throughout the helminthoid classes may be viewed as a separate being, with its exterior covering, and its muscles, its vascular and digestive apparatus, its brain and its nerves of motion and sensation."—Dr Grant, Lectures in Lancet, ii. 1833–4, p. 487.

the whole; these more important ganglia are subservient to the nutrition of the whole system; respiration is still diffused, and when the ganglia are separated from each other they will still present vital movements, the intensity and duration of which will be always in proportion to the power of nutrition and respiration possessed by the segment, and to the amount of force required for their continuance.

26. It is thus the parts of articulated animals (as insects) which have a large respiratory apparatus diffused through the body, display vitality long after mutilation; it is thus also that parts of certain cold-blooded Vertebrata, as the salamander, frog, and turtle display such remarkable tenacity of life. In these we have various circumstances favourable to continued vital action. 1. The vital movements can go on at the temperature of surrounding bodies, so that force is not expended in keeping up the heat of the vital mechanism; nor is the action of the latter impeded by its diminution, as in hot-blooded animals. 2. The skin is a respiratory organ, so that force is still obtained from the atmosphere by this, and perhaps even by the moving tissues themselves,* long after the proper respiratory apparatus is destroyed. Cuvier was partially right in asserting that the irritability of muscles is directly proportioned to the quantity of air the animal consumes; but he might have added also to the quantity needed, and to the diffusion of the respiratory apparatus; the air being the source of both motive power and warmth. (18.)

27. But in the higher Vertebrata, the ganglia are more centralized, the vital mechanism in connection with them requires a higher temperature, and the only source of this is a highly complicated apparatus, the action of which is solely dependent upon a central ganglion; so that the animal is absolutely individualized, and the destruction of the respiratory ganglion will arrest the movements and functions of the whole system. Consciousness itself (which is seated in the brain) is thus abolished, and hence the mistake of Mr Mayo, who, finding destruction of that part of the *medulla oblongata* which contains the respiratory ganglion to produce this effect, supposed this portion of the nervous axis to be the seat of consciousness.†

28. Now, just as the diffused nervous system embodies the elements of the ganglionic; and the movements in connection with the former (the movements of irritability) are typical of those dependent on the latter—the reflex or excited; so are the ganglionic

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* It is probable also that the tissues themselves are specifically different in their functions from those of the hot-blooded, and analogous to those of the cold-blooded articulata and animals with a diffused nervous system.

† Outlines of Human Physiology, 3d edition, p. 229.

phenomena illustrative of the cerebral; and the mode of action of the brain itself as the organ of mind, may in some degree be ascertained by an analysis of the series of phenomena just reviewed.

29. The discoveries of modern anatomists and physiologists have not yet been made available for this purpose; and the physiology of the brain has been studied altogether independently of that of the ganglia of the cord. The labours of Tiedemann, Meckel, Serres, Cuvier, Grant, and others have, however, accumulated a mass of facts and analogies of the highest utility, especially in establishing the identity of structure of the brain and spinal cord. I would refer the reader, in particular, to Mr Solly's lucid compilation as clearly establishing it. *

30. Leaving the reader to ascertain the truth of the following propositions for himself, from a perusal of the various facts collected in Mr Solly's and the works of various writers on comparative anatomy, I shall simply assume, that in man the hemispherical ganglia are ganglia central to the whole system, and the seat of mind, (14); that other portions of the encephalon form distinct nervous centres; that each pair of nerves originates from a series of ganglia in the spinal cord, analogous to those of the Articulata, but concealed by the addition of fresh parts, and by those nervous tracts in connection with the central or terminal ganglia; that the ganglia on the posterior roots are not the ganglia of the sense of touch, (which probably form a constituent part of the encephalon, Vol. I. p. 337,) but are accessory to the secreting structures imbedded in the skin, and precisely analogous to the ganglia of the sympathetic, (which aid the secreting structures of the viscera,) and to those diffused in the tissues; † and, lastly, that all these ganglia, whether cerebral, spinal, sympathetic, or diffused in the tissues, have the same generic character. (28.)

31. It is by no means my intention to review the whole of our knowledge respecting the structure and functions of the ganglia; I shall confine myself to those prominent points which may illustrate the principal phenomena of those diseases I have been investigating.

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* The Human Brain, its Configuration, Structure, Developement, and Physiology. London, 1836.

† Schwann observed microscopic ganglia in the mesentery of a frog; and farther researches on the mode of termination of the nerves in the tail of the larva of the toad have confirmed these observations. Muller's Physiology, translation, p. 604. Gall observes that ganglia have been found on the nerves of the arms and thighs, "Anatomie et Physiol. du Syst. Nerv. Tome i. p. 65." I remember finding a ganglion on a nerve in the wrist. In the forty-second volume of this Journal, a paper by M. Camus will be found, in which certain bodies resembling small ganglia are described as placed on the nervous fibrils, distributed to the plantar and palmar surfaces. I think all these must be considered as analogous to the otic and other small ganglia of the face. More may be found if carefully sought for, especially in parts of special sense.

32. The phenomena first to be noticed are those in which consciousness is directly involved, and which I have already enumerated. (1.) That the encephalon is the organ of consciousness, is a proposition almost universally acknowledged. It was the received opinion of the ancients; Newton, Dr S. Clarke, Locke, Malebranche, Hooke, Des Cartes, Reid,* and others among metaphysicians, have more or less admitted it; and it has been asserted by a host of medical observers, who are certainly those most competent to give an opinion. Among these may be mentioned Willis, Haller, Sömmering, Prochaska, Portal, Sabatier, Vicq-d'Azyr, Gall, Cuvier, and C. Bell.

33. It is in the encephalon, then, that those changes, which are excited by external and internal stimuli, are manifest to intelligence; or, in other words, consciousness consists in a perception of the changes thus originated in the brain by the forces of matter; yet not in the brain as a whole, but especially in the cerebral lobes or hemispherical ganglia. The will also is seated in this part; and as we are conscious of the power to perceive, so are we conscious of the power to will. These faculties, however, admit of no investigation, except through their relations to vital mechanism. (14)

34. We find that the changes excited in the system by the action of external forces are communicated to the brain and other ganglia by the sensitive nerves; that the will acts upon the muscles so as to excite motion through the motor nerves; and that a third class of nerves, the organic,—which are subservient to the perfection and repair of the vital mechanism, are influenced by certain mental agencies, of which we are conscious, but which are independent of the will; as happens in all the vital changes connected with emotions.

35. Of these nerves it may be stated, that they all communicate with a hypothetical point of perception and volition seated in the brain, and termed the *sensorium commune;* this point constituting the central, and the opposite, the peripheral termination of a nerve. It is not intended by this to advance the common doctrine, that all the nerves depart from one common centre; but rather, that they communicate with several central points situated on one common circle. Professor Muller conceives the nerves to be all spread out at their central extremity to receive the influence of the will, and compares them "as they lie side by side to the keys of a piano, on which our thoughts play or strike." †

36. The convolutions of the cerebrum and cerebellum have been

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* There is, therefore, sufficient reason to conclude, that in perception, the object produces some change in the organ; that the organ produces some change upon the nerve; and that the nerve produces some change in the brain. Essay 2, ch. ii.

† Physiology, p. 686 of Dr Baly's translation. This seems a favourite idea, as it is repeated by the Professor.

described by Gall and Spurzheim as consisting of two fibrous layers, containing between them a layer of grey matter;* or, in the more recent language of Mr Solly, they are an extensive surface of cineritious neurine, to which medullary fibres present their extremities. When we consider the enormous surface which these ganglia must thus possess, and the fact, as demonstrated by Weber and Smith, that the sensible points of the retina measure no more than $\frac{1}{8000}$ of an inch in diameter,† which may be considered the diameter of the sensible points on this surface, there is much less ground for surprise at the infinite variety of our sensations.

37. It was inferred long ago from the phenomena of health and disease, that the fibrils of the nerves must be insulated in their whole course from the periphery to the centre, and *vice versa*, but it is only recently that the microscope has enabled physiologists to demonstrate the fact. For this we are principally indebted to Ehrenberg and Müller.‡ To the labourers in the new field of research opened out by Sir C. Bell's discoveries, we are also indebted for a vast number of facts exceedingly elucidatory of the phenomena of nervous diseases. It is to the laws of sensation which have been thus illustrated that I must principally confine myself.

38. The doctrine of the excito-motory functions of the spinal cord, which, although not discovered, have been investigated and promulgated with much zeal and perseverance by Dr Hall; and the numerous facts accumulated by a careful observation of the phenomena of life, as well in vegetables as in animals, render it certain that there may be all the recognized phenomena of sensation, without consciousness. Thus the eyelid of the comatose will shut when the conjunctiva is touched; and decapitated cold-blooded Vertebrata and Articulata exhibit a variety of combined movements long after removal of the cerebral ganglia.§ Now, as conscious sensation depends on the latter, I shall consider the phenomena just mentioned as indicating physical sensation. In this term I comprehend the efficient cause of the motions of vital matter which follow the application of an external stimulus; so that the sensitive plant has physical sensation as much as the decapitated turtle or apoplectic man.

39. These movements in animals are simply the results of vital mechanism excited into action independently of the will. When the mechanism is not complicated, as in muscular fibres, or vegetable structure, it is said to be endowed with irritability. If com-

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* Anatomie et Physiol. Gener. du Syst. Nerv. &c. i. p. 299, sqq.

† Prof. Muller's Physiol. p. 702 of translation.

‡ Ehrenherg's Researches may be found in Vol. xlviii. of this Journal, and with Professor Muller's in the Physiology of the latter.

§ The proboscis or *antlia* of a common butterfly will coil up and uncoil when touched, three or four hous after separation from the insect. Kirby and Spence, Entomology, iv. 191.

plicated, the resulting motions are termed involuntary, instinctive, or automatic.

40. If the continuity of a sensitive point with the brain be interrupted, external stimuli applied to it excite no sensation; and when the sensitive nerve of a limb be divided the extremity is as insensible to burning, pricking, &c. as if it had been altogether separated from the trunk. But if the cut extremity still in connection with the general system be irritated, sensation is excited as if the terminal point on the limb had been irritated, and not in the part touched. These facts are too well known to need illustration.

41. Independently of the common inference drawn from them, it may be added that, as one function of the spinal cord, as regards the sensitive and motor nerves, is that of a conductor, all irritation of a sensitive nerve, whether in the spinal cord, or, even as far as its termination in the brain, must excite sensation referred to the peripheral point. Sir C. Bell was the first, I believe, to point out these facts. Dr Combe has also illustrated them,* and Professor Müller has pushed these inquiries still further. As his facts and inferences, so far as they go, resemble those which I proposed to publish in this Journal some time before I saw his, I refer the reader to the Professor's excellent Manual of Physiology for further information; and with greater confidence from the circumstance just stated. Nevertheless, I think these laws of sensation are capable of further illustration and application.

42. It may be inferred, that each point of a sensitive nerve has the same properties as the peripheral extremity; for, if stimulated, the same mental perception is excited as if the latter suffered the stimulus; if its extremity in connection with the brain be destroyed, its functions equally cease; and since it is matter of fact (40,) or a legitimate inference, that these may be predicated of a point in a sensitive nerve in any part of its course, even to the last globule, it is a fair inference that, so far as regards consciousness, the powers of the central and peripheral termination of a sensitive nerve are identically the same.

43. Sensation is not a perception of the qualities of bodies, but of the changes, which these excite in the terminating molecules of the sensitive nerve; and which changes when derived from the periphery, appear to be propagated from molecule to molecule, just as the (so called) electric or galvanic fluid, (14, 34,) consequently, any sufficient cause acting upon the molecules of a sensitive nerve in any part of its course, will excite these changes, or increase or diminish its susceptibility of change, as much as if ap-

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* "If we select a filament of a nerve of sensation, whether it be pricked or injured in the foot, thigh, spine, or brain, the perception arising will be referred to that part of the skin where the remote filament is distributed."—Sir C. Bell on the Nervous System, p. 18. Dr Combe's remarks may be found in his Observations on Mental Derangement, p. 8 sqq.

plied to either end. Thus in inflammation, such changes are excited in the peripheral terminations of the sensitive nerves, that we are conscious of heat and pain; and those impressions formerly unfelt or pleasurable now excite pain; provided similar changes be excited in any point continuous with the brain, or in the terminal point on the brain itself, there is a precisely similar affectible state of the peripheral end, as occurs in inflammation; although it be not involved in any disease whatever. Tic-doloureux, phrenitis, and hysterical neuralgia, illustrate this inference. So also, if the ganglia receiving the central termination (36) be rendered incapable of propagating the change, (33,) either by disorganization, or narcotics, we have sensation abolished equally as if the peripheral had been so paralysed. These principles are of the highest importance, and admit of most extensive application to all the phenomena of consciousness.

44. The same laws of action, *mutatis mutandis*, are as applicable to the motor nerves; and it is exceedingly probable that the action of all nerves is essentially similar.* Motion, like sensation, may be excited in vital mechanism, by internal and external agencies. 1. We have the change in the central termination, which originates motion when excited by the will. 2. There are the involuntary movements excited by internal stimuli, as by the passions, organic disease, &c. 3. The reflex, or those excited by stimuli applied to the periphery of the nerve, still in connection with its ganglionic centre; and 4. The movements of irritability, or those excited by stimuli applied to the nerve, as it is diffused among muscular fibres, and separated from the general system.

45. Sensations may be classed into simple or primary, and complex or combined, just as movements; and may not they be characterized under four subdivisions similar to the preceding? (44.)

46. *Firstly*, can such changes as shall become objects of perception be excited by volition? When we recal ideas by a volition, we re-excite those changes in the brain which constitute the original sensation. Thus when a painter makes a picture of a friend who is absent or dead, he recals the features by an act of will, and makes them an object of thought as much as if they were afforded by the original. It will be remarked that I am reviving the opinion of those who considered that all our perceptions are connected with changes in the brain; and although so high an authority as Dugald Stewart has pronounced opinions of this kind unphilosophical, yet I must venture to adopt it after many ancients, and Malebranche, Hooke, Locke, and Haller. If we acknowledge the brain to be the organ of the mind (32,) I cannot possibly con-

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* At least of those on similar apparatus. Thus the loop-like termination of nerves observed both in the brain, and muscular structures, (Müller, op. cit. p. 603, 606,) may indicate an analogy of function.

ceive how we can assert that no changes take place in it during our mental operations; if such be the fact, of what use is that wonderful and complicated piece of machinery? But daily experience is utterly opposed to such doctrine. In what these changes consist it is unnecessary to inquire; we may be certain, however, that they do not differ essentially from other vital changes, and that their type must be sought for in those occurring in the diffused nervous system, or in the ganglia. (28, 30.)

47. That volition will excite changes in the fibrils in connection with the perceptive and intellectual organs is plain from the phenomena of attention. We are conscious that we attend by an act of the will; and it is analogous to the excitement of motion by the will in this, that, the greater the energy of voluntary attention, the longer appears the duration of time.

48. Attention (which may be either voluntary or involuntary) may be directed either to the changes excited by external stimuli, when it consists essentially in the production of such physical changes in the central fibres as to render them more susceptible of impressions, whereby more vivid perceptions result (43); or it may be directed to the changes produced by internal stimuli, as our own thoughts. In the latter case the action of the will is intermittent,* as it probably is in the former. So, also, when we will motions the volition is not continuous but intermittent, as any one may learn by listening to the contractions of his own masseter muscle.† Dr Elliotson allows that we may will attention, but denies that we can call up a feeling at pleasure. However, the fact is otherwise.

49. By an act of the will we can also excite new sensations. Let an individual concentrate his attention upon the interior of his head for a few minutes, and he will experience various sensations on the skin, analogous to formication (48). Any one may will a sensation in their finger end by directing their attention to it (48).

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* When we are employed in studying an object not interesting, Professor Stewart says, "it is not an exclusive and steady attention we give it, but we are losing sight of it, and recurring to it every instant; and the painful efforts of which we are conscious are not (as we are apt to suppose them) efforts of uncommon attention, but unsuccessful attempts to keep the mind steady to its object," &c.—Philosophy of the Human Mind, Chap. vi. § i.

† Dr Wollaston's acute observation first made us acquainted with this fact, (Phil. Trans. 1810, p. 2. §. seqq.) He found the intermissions to be about 20 or 30 in a second. Dr Elliotson (Physiology, p. 479.) attempts to disprove the accuracy of Dr Wollaston's conclusions, but forgets the important fact that these vibratory motions are not of a set of muscles, but of particular fibres. I have easily listened to them many times in bed, by placing the side of my head and face close to a moderately firm pillow, and then closing the jaws forcibly, so that the contracted masseter may press the pillow. The vibrations will be found to be quickened according to the force of contraction excited. I have counted 140 in a minute when using a gentle force. Is there not an analogy here to the peristaltic class of movements, as of the heart?

Dr Elliotson mentions instances of this kind,* and the phenomena of Mesmerism (so called) are continual illustrations of the power of the will over the brain, either directly or indirectly through attention. To these I shall refer again. It is thus people can ward off attacks of nervous disease by an effort. (Vol. i. p. 325, 360.)

50. Internal stimuli excite involuntary movements (convulsions;) can they excite involuntary sensations? or, in other words, such changes in the brain that perceptions may be excited? Internal stimuli may consist in organic disease of the fibrils; in increased or retarded circulation of the blood through them; in alteration of its constituents as by poisons; or in changes induced in it, or in the nervous system by the passions. Dreams and spectral illusions of every kind are thus excited; so also are all sensations primarily connected with things external, but re-excited by functional or organic changes in the brain or spinal cord. Thus nervous patients complain of primary sensations, as whizzings, flashings, hammerings, explosions, and voices. Once, when half awake in bed, I heard my own name called most distinctly in my ear, yet no one called. A person had a continual smell of pus which nothing could relieve; after death an abscess was found in the *corpus callosum*.†

51. Maniacal illusions are frequently spectral, but the individual cannot perceive their incongruity with impressions derived from without; and hence incongruous sentiments and actions. In these cases the ideas or changes are secondary or complex; and may originate in false primary sensations. These various sensations and affections of the sensitive fibres may all be considered analogous to convulsive or involuntary motions.

52. External stimuli produce such changes in the nervous centres that the involuntary motions termed reflex, follow:—can they produce analogous sensorial phenomena?

53. Dreams have hitherto been among the most inexplicable of the phenomena of mind. Nothing, I think, can equal the clearness, acuteness, and originality of Professor Stewart's explanations, which have been treated with much unmerited neglect. Acknowledging the influence of the will in exciting mental phenomena, he remarks, that in sleep it "loses its influence over all our powers both of mind and body; in consequence of some physical alteration in the system which (he adds) we shall never probably be able to explain."‡ In accordance with this proposition he explains the incubus by supposing it to differ from ordinary sleep, in this, that uneasy sensations render us distinctly conscious of our inability to move."§ Stewart explains dreaming by sup-

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* Human Physiology, 5th edition, p. 497.

† Cabanis, Op. cit. Mem. iii. §. i.

‡ Op. cit. Chap. v. Part v. § v.

§ Ibid.

posing that the thoughts arise from associated ideas only; the voluntary power over the ideas being suspended (49); and he attempts to establish two propositions, 1. That the succession of our thoughts in sleep is regulated by the same general laws of association as when we are awake; and 2. That the circumstances which discriminate dreaming from our waking thoughts are such as must necessarily arise from the suspension of the influence of the will.

54. This is not the whole truth, but it is quite correct as far as it goes. Stewart's explanation of the action of opium on ideas, and of the phenomena of somnambulism, are equally clear and philosophical as regards the altered relations of the will to the brain; and superior in this respect, I think, to the more modern of Macnish and Elliotson, who have copied from him. By changing a few terms, and adding those explanations derived from physiological facts, with which Stewart was not conversant; it will be easy to show, that the excito-motory phenomena of Dr Hall, confined by him to the spinal cord, have their analogues in the cerebral hemispheres. In short, that there is a large class of combined involuntary sensations or ideas which are excited secondarily by stimuli from without, and may be termed excito-sensory, if Dr Hall's nomenclature be followed.

55. The only motions now remaining, then, for which we have to seek an analogue in sensorial phenomena are those of irritability. To save the time of the reader, I must here hypothetically assume that the brain is not only a centre but a periphery, corresponding to the external periphery from which sensitive nerves originate, and in which the changes originated by matter commence; but itself originating fibrils which carry changes in the opposite direction, so that the action of the will on this internal periphery in exciting sensation and emotion must be considered as analogous to that of force on the external periphery (15), (36).

56. The action of force and will on organized matter, then, may be considered as identical; and the molecular changes induced by the will on the internal periphery as analogous to those induced by the forces of matter on the external. Consequently, the changes indicated in section 50 are analogous to those of irritability.

57. And I may here add, that these peripheries correspond in their powers in other modifications of life and thought. Tickling the feet will excite as hearty and involuntary laughter as tickling the fancy by a ludicrous idea; in the latter case, the series of molecular changes combining to produce this spasmodic action of the respiratory muscles, and propagated to the proper centre, originate on the internal periphery; in the former, on the external.

58. Having thus sketched a very broad outline of the doctrine, that vital actions are essentially the same, whether displayed in vegetables, or in animals, with a diffused nervous system; whether

in these, or ganglionated animals; or, whether in the spinal cord or brain; I shall be able to review the remaining phenomena of hysteria synthetically presenting them as illustrations; and shall also possess a new starting point for an analytical inquiry into the seat and nature of the whole series.

59. Coma consists in an abolition of consciousness. There is no volition, nor any perception of external or internal stimuli; and life consists in a series of automatic movements. It is scarcely necessary to particularize its numerous proximate causes. It is frequently a very alarming symptom of hysteria, and, as might be expected from my preceding remarks (Vol. I. p. 307,) is consequent upon every exhausting agency of a certain degree of intensity, as profuse blood-lettings or other evacuations; debilitating diseases of mucous surfaces, mental or bodily fatigue, and violent passions. It is very frequently induced by poisons, whether they enter the system by absorption, or consist of the excrementitious matter accumulating in the blood from deficient elimination; as when the excretion of bile, urea, or carbonic acid is prevented by diseases of the kidneys, liver, or lungs. Profound sleep is the type of coma; in both, there is complete paralysis of the brain, and the usual changes which constitute ideas and excite volition, are not originated by any stimulus whatever.

60. When the causes of coma act with less intensity, changes are excited which we perceive; but there is still paralysis of the primary organs of perception and volition. We can both perceive and will, but the changes in the motor nerves necessary to motion cannot be excited, nor can we perceive the primary changes or sensations in the sensitive fibrils resulting from external stimuli. These, however, originate other changes which become objects of perception, and which are analogous to reflex movements. (53, 54,)*

61. Delirium originates from all the causes which will excite coma or paralysis, only they act with less intensity than in exciting the former. We have a less amount of paralysis of the cerebral organs; the ideagenous changes, or changes producing ideas, (33, 43,) are more complicated, because the primary sensations derived from without are more or less perceived; the motor nerves may in an equal degree be influenced by the will; and the

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* The opinion, that the perceptions of our dreams are resuscitated ideas, is very common; but the above remarks refer to the mode in which they originate. The following will illustrate the text. I dreamt I was perambulating some of the narrow dark alleys of the parish of St Giles, London, visiting dispensary patients; I breathed in them with difficulty; and, at last, in one I felt as if suffocated. I awoke in affright, and found the bed-clothes twisted about my face, obstructing respiration. I dreamt of running and walking rapidly, least I should be left by a party; and awoke in my hurry as wet with perspiration as if I had been using the most violent exertion. Now, in these instances, I conceive the sensations of perspiration and obstructed respiration became associated with other ideas, and gave them their connection.

sensory apparatus is also in part under the same control, for the individual is capable of an act of attention (48); or, in common phrase, he will listen or speak when roused;—the act of will placingthe sensory apparatus in a state such that external stimuli produce a more vivid impression, removing, in fact, the paralysis during the effort, just as motor paralysis may be removed by the same means.*

62. Spectral illusions are dependent upon similar morbid states, the affection being frequently circumscribed, and there being no paralysis of the primary sensitive fibrils. Consequently, all the senses give correct impressions, and unless the individual be insane, that is, have paralysis of the comparing and judging organs, he is perfectly aware of their real nature.

63. The causes of spectral illusions are the same as those of other nervous diseases, of which they are frequentlyasymptom, and are influenced by the same circumstances. They are observed in cases of epilepsy, loss of blood, injuries of the scalp, &c. They are most freqnently perceived in the night, as are the other phenomena of functional nervous diseases; and are perhaps more common in children than usually suspected, their tales of ghosts being generally disbelieved. The spectres are of those classes of objects which are more familiar or impressive to the individual, or have been early or deeply impressed on the mind.† They follow indeed the laws of memory in every respect.

64. Another peculiarity is, that the spectres are most frequently dressed in red. Mr Abernethy mentions an instance of this kind; ‡ and Mr Macnish asks why they should appear in red rather than blue. § The solution of this question must be sought for in the laws of the sensorial action of colours, a glimpse of which I have already indicated, (Vol. I. p. 349.)

65. Other sensorial illusions are analogous to the spectral, as of voices, and tactile sensation. ‖ One remarkable illusion is that in which the individual refers his sensation to some other person. A man comes home exceedingly drunk, and is positive his servants are too drunk to undress him. A delirious patient when he was hungry said his nurse was. ¶ I visited an individual dying of sphacelus of the leg. He clutched at the air, expecting to grasp a fish-hook; (being an experienced angler,) (68;) and when ly-

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* In these cases the attention or effort of will is involuntary. Sensorial paralysis of insanity may, as well as common paralysis, be removed by the same means. A case of a lunatic cured by fright may be found in Med. Chir. Rev. xxvii. p. 540.

† Dr Alderson's Cases in Edin. Med. and Surg. Journal, Vol. vi. Mr Craig's case, with remarks, by Dr Craigie, in Ibid. Vol. xlvi. Wesley's Journal, *passim*.

‡ Lectures in Lancet, Vol. xi. p. 27. § Philosophy of Sleep, 2d ed. p. 261.

‖ Case by Dr Bright, in Guy's Hospital Reports, No. iv.

¶ J. Hunter's Works, i. p. 335.

ing still and moaning, turned round and asked occasionally, " Who was disturbing him so?" " Who was in pain!" An individual returns late at night from a public assembly, where he has taken more fluids than customary, and he dreams of the company, and that some one is in great distress from a distended bladder, which he strongly recommends the supposed suffering individual to evacuate. The pain increases; the whole assembly appear conscious of it, and is disturbed; and at last he awakes to find that the distended bladder is his own. This mistaken individuality is sometimes observed in the insane.

66. Spectral illusions vary in degrée from those of complete delirium and mania, to that state in which the perceptive organs are in full vigour; and, as another proof that the sensorial fibres are in some mode under the control of the will, it may be mentioned that they may be made to appear or disappear in some cases by an act of will, and have actually become a source of amusement to the patient, who has diverted himself by calling up or dismissing the phantoms at pleasure. One individual informs me that his illusions have very much the character of the phenomena of the kaleidoscope. He can make them disappear by shutting his eyes, although they appear in the night.

67. Somnambulism is also one of the same class of sensorial affections as dreaming, delirium, and spectral illusions; and it has the same affinity to other nervous diseases. It would but weary the reader with a repetition of illustrative facts.* It is much more common in children than suspected, being overlooked because their actions are less definite, and the attack does not depend upon permanent change in the brain. Like other nervous diseases it is hereditary and hepta-periodic,† and almost invariably occurs in the night.

68. Somnambulism has attracted considerable attention from its facile excitement in hysterical females, by various movements called *passes*. I have already pointed out that an act of attention is, in fact, an act of the will; which, I may now add, produces a state of the sensorial fibres analogous to that resulting from various nervine alteratives, as strychnia, opium, loss of blood, &c.

69. It must be remembered, however, that although all sensorial volitions are necessarily accompanied by exalted affectibility of that portion of the nervous system willed-on, other portions become by a law of our constitution less affectible in various degrees, to complete *anæsthesia;* and in the same order, as occurs on the approach of sleep, or in cases of mania, poisoning, exposure to excessive cold, or in great fatigue. ‡

70. When about to sleep, external stimuli cease to excite pri-

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* See last Paper. † Macnish, op. cit. p. 162. 171. Elliotson, op. cit. p. 659.

‡ Dr Burrow's Comment. on Insanity, p. 465, and other writers.

mary sensations, long before the secondary ideagenous changes they produce are no longer objects of consciousness. The maniac or delirious, wrapped up in one idea, and with exalted faculties of music, poetry, or mimicry, will have almost lost the sense of touch; and will thrust his feet into fire without the slightest expression of pain.[*] In intoxication the system is at first over-excited, and then there is loss of common sensation, so that the tippler is most happily unconscious of external injuries, even the most severe, although his mental powers be at the same time exalted. And such precisely is the effect of intense attention. Marini, an Italian poet, while revising his poem Adonis, had the anæsthesia of attention so remarkably, that he burnt his leg severely before he was aware.[†] How often, when absorbed in thought, do loud sounds fall unnoticed on the ear? The most instructive illustrations of the connection between cerebral excitement and partial anæsthesia are found in those cases in which inflammatory action within the cranium occurs during the progress of phthisis; when all pulmonary irritation so completely ceases that it has been supposed there was a metastasis from the thoracic viscera to the encephalon. Dr Abercrombie,[‡] and Dr Storer,[§] have noticed this class of cases.

71. Any proceeding, then, which will concentrate the attention of a person endowed with an affectible nervous system, upon any portion of the brain, will excite that portion, but at the expense of the affectibility of other portions; and according to the degree of affectibility, the amount of excitement, and the varying powers of the organs acted on, we may have phenomena varying in intensity.

72. There may be simple headach only, or anomalous sensations in the parts to which the attention of the mesmerized individual has been directed (49); coma, spectral illusions or delirium (68,) characterized as loquacious, musical, &c. according to the portion of brain most affected; and *lastly*, the higher phenomena of connected dreaming or somnambulism may appear.

73. Complete anæsthesia, excitement of the brain giving rise to vivid spectral illusions, and voluntary power over the motor fibres, are the distinguishing characteristics of somnambulism.

74. It is very improbable that the somnambulist derives any primary sensations from without. His actions result altogether

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[*] We have the authority of Captain Parry, and Colonel Shaw for the fact, that both these will excite a state resembling that of intoxication.

[†] D'Israeli's Curiosities of Literature, Vol. ii. p. 397. Cabanis makes a variety of interesting remarks on consciousness, with reference to the more uncommon forms of nervous affection. He unfortunately compares it with a fluid, the quantity of which is determined; so that if it be increased at one point, it is proportionally diminished at another. (Rapports du Physique et du Moral, R. Mem. ii. § vi.)

[‡] On Diseases of the Brain and Spinal Cord, p. 49.

[§] Edin. Med. Chir. Trans. Vol. iii. p. 613.

from internal sensations; and if they appear to have the precision of waking, it is because the somnambulist is in a locality corresponding to his dream. Remove him from the locality, and he gropes and stumbles.

75. Sometimes, however, the anæsthesia is not complete. The individual is rather delirious than sleeping, and secondary sensorial changes which have a relation with his dream are perceived.*

76. The spectral illusions of the somnambulist are, like those in other cases, derived from objects familiar to the individual, or which have impressed him at an early age. Their vividness also will depend upon the amount of power by which the attention is concentrated, which itself will be a definite ratio to the anæsthesia; there being no changes excited in the paralyzed sensorial organs, such as to direct the act of will to them. There are individuals who possess a remarkable power of forcibly impressing upon their imaginations any scenery they have heard described or witnessed. The blind have this faculty in an eminent degree; and so the re-excitement of these impressions during delirium or somnambulism would be proportionally more vivid in them. We have thus, I think, a natural and plausible explanation of those marvellous instances in which the soul is supposed to leave the body, (just as the vulgar imagines it acts in sleep,) to visit objects and cities it had never seen. The catch-penny tale of Colonel Stone's mental journey with a blind Mesmerized female to a distant city at which she had never been, is simply the history of a somnambulistic dream.

77. An act of the will on the sensorial organs is strictly analogous to common motor volition in this, that it becomes easier by repetition, and at last involuntary. After an individual has been mesmerized repeatedly, certain movements (passes) are no longer necessary to the excitement of sensorial volition; it has become a habit, is produceable by the slightest associated circumstance, and may even be under the direct control of the will. The phenomena themselves are not willed, but the changes which excite them are; and this, I conceive, has been the mode in which disinterested observers have erred. There cannot be a question that the O'Keys thus excited real phenomena† just as hysterical

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* Occasionally somnambulism assumes a form very similar to drunkenness. Sauvages (Nosol. Method. Tom. ii.) relates the case of a female who was insulted by a rustic while menstruating; periodical attacks of cataleptic somnambulism were induced in which she would mistake her medical attendant for her enemy, and follow him, or his shadow round the room. She had no recollection of her husband. The comic annals of drunkenness abound with analogous instances, *e. g.* a lisping young gentleman was intoxicated and fell into a ditch on his way home; after swallowing a mouthful of the water he very politely exclaimed, "not a sthup more, thank you." Worms in the alimentary canal are sometimes coexistent with a similar state; a case may be found in Vol. xlii. of this Journal.

† Lancet, Vol. ii. 1837–8, *passim*, especially the leading article of September 8th.

girls can bring on convulsions at will, and any body ideas, sensations, and mental emotions, with more or less facility.[*] Consequently there can be no question of the possibility of voluntary common somnambulism, being induced by Brahmins and Fakirs, as stated by Dr Elliotson from a French writer.[†]

78. There can be no doubt that this voluntary power of exciting real phenomena has frequently aided impostures. An epileptic may thus easily induce a fit. The Pythian priestess, the wizards of Kamtschatka, the whirling dervises of India, the serpent-eaters of Egypt, the second-sight men of the Highlands, the "wise men" (μαγοι), and prophets who may still be found in Yorkshire, and the O'Keys, are all of the same family. All knowing how to excite convulsions, delirium, spectral illusions, and somnambulism in themselves or their dupes by mental acts or drugs.[‡]

79. The prophetic power (so called,) observed in cases of ecstacy, somnambulism, &c., is probably a very simple phenomenon. It may be considered as nothing more than an exalted faculty of judging and comparing, itself the result of morbid excitement. Many religious enthusiasts have exhibited it:[§] it has been observed in dreams; individuals in the delirium of death have prophesied. Aretæus observed the power developed in the patient towards the fatal termination of καυσος, or brain fever;[||] Patroclus when dying foretells the death of Hector; and Hector in his last moments the death of Achilles. Virgil, in imitation of Homer, makes the dying Orodes predict the death of Mezentius,[¶] and Shakspeare has similar scenes. Sir H. Halford has witnessed an instance of this kind.[**] Mr Madden explains this lightening of the mind

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[*] "We can excite a sensible degree of the passion of anger in our own breast, by imitating the looks and gestures which are expressive of rage."—D. Stewart on the Active and Moral Powers, Ed. 1828, p. 119. This is one of the great secrets of good acting.

[†] Human Physiology, 5th ed. p. 692.

[‡] An act of attention may be and often is involuntary or instinctive. Point at the hand of a nervous female and she will complain of a sensation as if cold or warm air was blowing upon the part pointed at; this I have often verified. The sensation probably depends upon changes in the central termination of the sensitive nerves, (43, 48,) excited by the act of attention. Of this character are many sympathetic phenomena. *e. g.* A female aged 48, who had not menstruated for eight years, while attending her daughter during a tedious labour, experienced uterine pains, a sanguineous discharge from the vagina, and on the third day the mammæ swelled and became painful to the touch; a milky fluid escaped from the nipples for five or six days, and the symptoms then disappeared. Dr Paillard relates a similar case, (Med. Gazette, i. p. 550.) Sir B. Brodie has had patients who, having a friend with cancer of the breast, have worked themselves up into the belief that they had the same disease. (Had they tumour of the breast?) Sir Benjamin also remarks, "that there is no part of the body hut what seems to be in pain during a state of disease, if the patient's attention be drawn to it."—Lancet, i. 1838–9, p. 40.

[§] Wesley's Journals.

[||] De Caus. et Sig. Acut. Morb., Lib. ii. cap. iii.

[¶] *Æneid*, x. 740.

[**] Essays and Orations, 2d ed. p. 60. This essay (the 6th) contains numerous classic allusions.

before death by supposing that venous or deficiently aerated blood acts as a stimulus, producing effects resembling those of opium. Physical pain is lulled; the sensations exalted and soothed; long forgotten pleasures recalled, &c.* Most persons must have witnessed at one time or other the ecstacy of dying piety; and which must be considered as the testimony of a well-spent life, for it is but the re-excitement and exaltation of previous ideas and feelings by the physical changes in the brain which precede death. (50.)

80. As a general fact, it may be stated, that gradually impaired or interrupted function of both the sensitive and motor nerves, is preceded by increased affectibility and exalted energy. This is continually shown in sleep, mania, poisoning, loss of blood, &c. Professor Müller also notices this general fact, distinguishing the states by the terms excitable and paralytic. †

These, and the remarks made on hysteric cunning (Vol. L. p. 64,) will amply suffice to explain the phenomena of mesmerism, without having recourse to the dreamy theories of the Germans, and of their imitators in France and England.

81. Before dismissing this part of the subject, I may be permitted to call the attention of physiologists to the sensorial action of colours, as affording a clue to a further analysis of sensorial phenomena, with especial reference to their chemical relations to light and its alteratives. Red and its complementary colour, green, present the most prominent points for inquiry. (See Vol. L. p. 349.)

82. In attempting to ascertain the nature and seat of the diseases I have been investigating, I shall follow the synthetical plan, with reference to those symptoms which implicate the cerebral ganglia.

83. We have found that a large number of vital phenomena are performed without consciousness, (38); consequently, there must be a class of nerves to which the laws of consciousness are not applicable; and which must be the organs of physical sensation (38), and involuntary motion.

84. It is only within the last few years that the division of nerves into motor and sensitive, for many years hypothetical, was experimentally demonstrated by Sir C. Bell. The nerves of the sympathetic system have always been distinguished from every other; and have been most recently investigated under the name of the grey or organic nerves. Dr M. Hall has very recently advocated the theory of a system of nerves, distinct from the preceding, which he has termed the excito-motory, and which comprehends two sets of nerves, the incident and reflex; and which

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* The Infirmities of Genius illustrated, 2 vols. 8vo.

† Op. cit. p. 711.

Mr Grainger thinks he has demonstrated.* Lastly, the researches of Bellingeri, and numerous observations on muscular action in health and disease, lead to the inference that there is another set of antagonizing nerves distributed to all antagonizing muscles. † These nerves, according to Bellingeri, are distinguished as well in their origin as termination; the brain and anterior columns of the spinal cord being in connection with those which regulate the motions of flexion and abduction; and the cerebellum and posterior column, with the nerves of flexion and abduction.

85. The nerves, then, are, 1. of common sensation; 2. of special sensation; 3. of voluntary motion; 4. of incident sensation; 5. of reflex motion; 6. and 7. of the antagonizing system; and 8. of secretion. It may be remarked, however, that if the principle upon which this division has been founded be once admitted, the genera and species of nerves may be extended indefinitely. The nerves of secretion may be as numerous as the secretions and excretions; and we may very fairly infer from the physiological action of colours that there are special fibrils for the perception of each. Whether the principles be correct or not, such an arrangement would be inconvenient, and I shall therefore adopt the usual division, with certain modifications.

86. The sensitive nerves of both systems (the voluntary and involuntary) may be divided into nerves of special and common sensation, or, in other words, into cerebral nerves of special conscious sense and common sensation (33,) and ganglionic nerves of special physical sense and common sensation. (38.)

87. The nerves of special conscious sense are distributed to the organs of the senses, including the tactile apparatus on the skin; and perhaps ought to be considered as essentially nerves of physical sense prolonged to the ganglia of consciousness. Their office is to communicate to the sensorium the effects of force on the peripheral molecule of the nerve (43), whether displayed in the various primary qualities of matter, as resistance, (comprising hardness, elasticity, &c.,) weight, and temperature; or displayed on etherial media, and giving rise to the phenomena of hearing and vision. They are all distributed to special apparatus both of sensation and motion, together with nerves of special ganglionic sense, as in the sphincters; but are in direct connection with the hemispherical ganglia.

88. The nerves of special ganglionic sense communicate physical sensation (38, 39,) to the encephalon and ganglia in connection

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* Observations on the Structure and Functions of the Spinal Cord. London, 1837.

† In Vol. xlii. of this Journal, page 400.

with instinctive and involuntary movements.* That the sensitive nerves of the sphincters (which latter are in fact the terminations of the external tegument) are both cerebral and special ganglionic nerves, is proved by such facts as the following: Irritation of the nerves of the bladder being communicated to the spinal cord, excites, in addition to involuntary muscular action, such changes upon the sensory fibres traversing that part of the cord, and derived from the skin covering the perinæum, groins, thighs, and orifice of the urethra, that sensations are perceived in them according to a general law (41, 43,) but not within the bladder or urethra; irritation of the intestinal canal (as from worms) may excite a reflex movement (tetanus); or the sensation of tickling or itching of the nose and anus, and probably irritation of the pharynx, and consequent vomiting. The pain of colic or of stone is seated in a nerve of common sensation, and differs altogether from those affections of special sensitive nerves which, when irritated, always give rise to the sensations peculiar to them. Thus, the optic nerve, when mechanically excited, originates sensations of light, the auditory of sound,† &c. and so disease of the spinal cord causes tingling in the skin, never in the stomach or intestines.

89. Tickling the sides of the thorax excites the same sensations and movements as a ludicrous idea; so will tickling the feet, (57.) In the latter case, when disease of the spinal cord has destroyed the continuity of the nerves with the hemispheric and respiratory ganglia, we have neither laughter nor conscious sensation, (87); but if the dorsal or lumbar ganglia be uninjured, and are in an affectible state, we have convulsive retraction of the extremity. It is upon these and analogous phenomena that the excito-motory theory is founded. But I think it a more simple explanation, to suppose that the phenomena vary according to the ganglia in which the changes excited, in the peripheral end of the nerve terminate (56, 87), or according to the affectibility of those which the nerve traverses. If the series of changes could be arrested in the respiratory ganglia, we might have loud laughter without consciousness, (88.) The relations of the cerebral and ganglionic sensitive nerves to the secretory are analogous to the preceding. Secretion like motion, may or may not be accompanied by sensation.

90. When the instinctive or involuntary movements are accom-

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* In illustration of the text, I may state that ganglionic nerves of special sense are, like the cerebral, distributed on special apparatus; it is thus that reflex movements are excited more vigorously by touching certain points of the surface than the trunk of the nerve, a fact noticed by Whytt, Volkman, and others. See translation of Prof. Muller's Physiology, p. 722, and the note by Dr Baly, p. 710. Mr Grainger reports experiments most pointedly illustrative of the fact in his recent work on the Spinal Cord, p. 55, sqq.

† Gall and Spurzheim, op. cit. Tom. i. p. 130. Muller, op. cit. p. 623.

panied by conscious sensations, they appear to be simply those of pleasure and pain, which powerfully aid in the conservation of the animal, and continuance of the species.

91. Galen's experiment on a fœtal kid was perhaps the first which demonstrated that instinctive actions were at least independent of experience. But the bias to metaphysical theory for a long time prevented them being viewed in their proper light. In 1771, Unzer pretended (to use the words of Gall) that the irritation of a nerve, whether it arrived at the soul or not, could of itself, and independently of the will or power of the soul, produce an impression upon the nervous and muscular systems, and excite movements. He thus attempted to explain the actions and habits which appear spontaneous in certain animals. He showed also, that, in those classes of animals which were supposed to possess a soul, and in man himself, movements take place without the participation of the soul, and which consequently continue a certain time after death.* Prochaska treated largely of those movements subservient to the conservation of the animal; and showed how they might be excited by external stimuli, without the intervention of the will or consciousness. (39). Mr Grainger unacquainted, apparently, with these writers, takes up the same doctrine.

92. Dumas inferred from various facts, that voluntary movements and consciousness do not depend upon the brain, which was an error. In support of the doctrine, he quoted the experiment of Duvernay, who removed the brain from a pigeon without apparent injury; it continuing to live, eat, and perform various functions. He also referred to the experiment performed by Perrault on a lizard or viper, which lived and ran to its hole after its head was cut off and intestines removed.

93. Gall does not appear to have suspected the great truth concealed beneath these facts. He was certain that the opinion of Dumas was erroneous; but he never supposed that there might be all the phenomena of conscious sensation without consciousness, and independently of the hemispherical ganglia. He therefore treated the facts as unworthy of credit; called them edifying tales; and recommended physiologists to verify observations before they founded theories upon them, which contradicted all the known laws of organization.† Gall was a man wrapped up in one idea, or he would have taken the trouble to verify the observations himself at the nearest fishmonger's.

94. Yet he acknowledged that analogous phenomena, namely, the instinctive actions of young animals, take place without con-

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* Gall, op. cit. Tome i. p. 7.

† Op. cit. i. p. 81.

sciousness; and even attempts to explain them.[*] Although Gall thought he triumphantly refuted the accusations of those who maintained that he was renewing the old doctrine of innate ideas, he does not satisfactorily explain why a chicken with the shell still on its tail will peck at a spider or a grain of corn, or why the calf of a tame cow by a wild bull exhibits unusual fierceness. No one will imagine for a moment that chickens learn by experience what is their proper food, or that the calf learns from its dam.

95. But Gall extended still further the doctrine of innate ideas, (for such it really is,) and fell into the views of Unzer and Prochaska, (91). He maintained that joy, sorrow, fear, &c. are not excited by the will, but are felt before the individual has so much as dreamed of them. All that passes is an arrangement produced by nature, intended for the external world to secure " la conservation de l'animal et de l'homme, sans qu'il y ait conscience, reflexion, ni participation active de l'individu."[†] He also asserted that these passions, when of a certain intensity, are accompanied by actions which are independent of the will and of consciousness; but which all tend towards the end proposed by nature, the conservation and ease (90) of the individual. Thus in fact classing the phenomena of the passions with the movements excited by external stimuli independently of consciousness and of the brain, and which have been remarked on by Unzer, Haller, Prochaska, Hall, Müller and Grainger.[‡]

96. This slight historical sketch furnishes ample proof, in addition to that I have already given, of the truth of the proposition, that the cranial ganglia, although the seat of consciousness and will, are subject to the same laws as those which govern the other ganglia, the diffused nervous system of lower animals, as the *Hydra viridis*, and the vital mechanism of vegetables, (28.) In short, that in the whole series there is a machinery perfectly adapted to external nature.

97. In man, however, there is certainly something more. While brutes merely follow the impulses, simple or compound, derived from pleasure and pain, man has a mechanism adapted to a moral world, and in this the will forms a prominent feature. A consideration of its relations is the object of ethical philosophy.[§]

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[*] Op. cit. ii. p. 11. [†] Op. cit. ii. p. 12.

[‡] Professor Alison must also be added to the list, if he still maintains the opinion given at p. 355 of his Outlines of Physiology.

[§] It is not probable that inferior animals have a moral consciousness; that is of the power to will or not will, and of a Deity. " Quæ est enim gens aut quod genus hominum, quod non habeat sine doctrina, anticipationem quondam deorum? quam appellat πρόληψιν Epicurus," &c. Cicero de Natura Deorum, Lib. i. §. 16, 17.

98. The physiological and pathological facts upon which the excito-motory theory is founded are quite analogous to the preceding, and may be found at length in the works of Dr Hall, in Professor Müller's Manual of Physiology, and in recent volumes of the British Medical Journals. I may also add, that the cases and illustrations I have published constitute a series of similar facts.

99. With regard to the whole class of combined movements with sensation, noticed in my last paper, (Vol. L. p. 340,) and which themselves are the phenomena accompanying various forms of ideas, emotions, and impulses, and are consequently involuntary, it may be remarked, that they furnish additional proof of the existence of the hypothetical internal periphery before noticed, (57,) as corresponding to the external. Whether its components be essentially distinct, as Dr Hall supposes those of the external periphery to be; or whether there be two peripheries, one the organ of conscious, the other of physical sensation, in connection with the instinctive or automatic movements, is matter for further inquiry.

100. The causes of these combined movements are similar to those by which combined ideagenous changes are excited, and which constitute spectral illusions of every kind. (50.)

101. Special or general convulsive movements, being, with the exception of the antagonizing movements (Vol. L. p. 340, §. 3, 344), dependent on the spinal ganglia, are never perhaps connected with sensorial changes, except in so far as the affectibility of the system is increased by acts of attention, whether they be voluntary or involuntary (48, 68, 78, note.) It is thus the sound of water dropping, or the perception of brightness, or mental emotions, excite hydrophobic gasp, and tetanic and other convulsive movements. (Vol. L. p. 322, *sqq.*)

102. The organs implicated will, of course, vary according to the parts of the nervous system in which there is morbid action; and according to the varying influence of the hurtful agents. Thus we have found that, in females, the organs under the special influence of the generative system are peculiarly liable to morbid action, the phenomena of which constitute the larger proportion of the symptoms of hysteria. (Vol. L. p. 34, *sqq.*)

103. We have now to inquire what central parts of the nervous system are implicated in these diseases. I have already partly ascertained this. In a previous paper, (Vol. L. p. 310,) I deduced the synthetical principle, that the organs in connection with the two ends of the spinal cord were principally affected.

104. The general relations of the cranial ends of the cord are obvious from the foregoing inferences. We have found that the fundamental organs in all organisms are a nutritive and respiratory apparatus; and that the due action of these is necessary to the

continued existence of the individual, (19.) External stimuli act upon these in vegetable and the lower animals, solely; there is no sensation nor consciousness, because there are no ganglia.

105. In higher animals the mechanism of these functions is concentrated in the cranial cord, (25, 27,) being still, however, under the same general laws; and as we find a variety of mental phenomena subservient to the same purposes, and regulated also by the same general laws, (95,) it is a fair inference that the seat of these is in a part of the same nervous system; in short, that mental emotions and physical sensations act upon a sensorial system in anatomical connection with the ganglia of respiration and nutrition.

106. The connection of the lower end of the cord with the generative organs is also obvious, from the first part of the analysis. (Vol. L. p. 310.) But the physical sensations in connection with the reproductive functions do not differ in their nature from those of the conservative; are equally imperative and extensive, (Vol. xlix. p. 63.);* and, as appears from the whole series of phenomena, are closely connected with the respiratory ganglia (103.) So that both the conservative and reproductive mechanism within the cranium, and connected with sensation, will be found in connection with the ganglia just mentioned.

107. The phenomena resulting from the centralization of the functions of the respiratory apparatus and its dependencies in the respiratory ganglia and from their connection with cranial ganglia of involuntary sensation and movement, constituted the basis of all those medico-metaphysical theories of the ancients and moderns, which located a soul in the epigastrium, diaphragm, and heart. But the varying states of the blood, and its consequently varying action on the nervous system, received merely a secondary consideration; or were noticed only in the conflicting theories of the Humorists and Solidists.

108. The blood is the product of the respiratory and nutritive apparatus; there is a remarkable similarity existing between the phenomena of hysteria and those resulting from a morbid state of the blood, (Vol. L. p. 307, *sqq.*); the processes of secretion and excretion, upon which the healthful state of the blood depends as well as the action of mental emotions and sensations upon the processes themselves, are, for the most part, involuntary; so that we must look to the same nervous centres for a common centre of secretion; or, at least, we may be quite sure that the centre through which the secreting organs in general are influenced by the passions, (Vol. L. p. 318), is seated in those parts of the nervous system indicated in section 105.

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* "Le plus grand acte de la nature, est la reproduction des individus et la conservation des races."—Cabanis, in Analytical Table by D Tracy, prefixed to his Memoirs, p lv.

109. We find that the appearance of physical love is dependent upon the developement of certain organs,—the ovaries (Vol. xlix. p. 30, and *sqq.*) not less than the due evolution of other structures, as the uterus, mammæ, &c.; and it becomes a matter of some consequence to inquire, by what means the ovaries exercise this influence: That is to say, 1. Whether it be communicated directly to the organ implicated through special communicating nerves; or, 2. Whether a similar communication exist between the ovaries and the nervous centres, in connection with the ovarian dependencies; or, 3. Whether the ovaries pour into the blood a secretion which has a special action upon these structures.

110. With regard to the first proposition, I think it altogether untenable. It may be stated in favour of the second, that emotions or passions act upon precisely the same structures, and excite analogous phenomena, and we are certain that the influence of these is unquestionably from the centre to the circumference. So that sensorial changes may be propagated from the generative structures to their appropriate nervous centres, and there give rise to a series of changes, to be reflected, on the one hand, to the sensorium of consciousness; on the other, to the organs on the external periphery; and so give rise to intellectual phenomena, and a series of movements and secretions.

111. The third has a general fact, also, in its favour, namely, that substances taken into the circulation will act upon one part of the nervous centres in preference to another. It is not certain, however, that these act so exclusively from the nervous centres as mental emotions.*

112. The disciples of Gall conceive that that talented individual has set the question at rest; he, as is well known, having appropriated the cerebellum to the sexual passion; and made developement of the generative organs and of their accessory structures dependent upon this portion of the encephalon. Gall has immortalized himself by his persevering maintenance of the indubitable truths, that the brain is the organ of the mind, and that it is a compound organ; but he was not free from the very common and pardonable fault of all discoverers of general principles, that of pushing the application of them further than warranted by fact.

113. The appropriation of the cerebellum solely to the sexual impulse is as contrary to the first principles of phrenology, as the assertion, that the brain is the individual organ of mind. The ce-

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* Cabanis advocated the doctrine, that there were different centres of sensibility; but he confined them to the abdominal ganglia. "Il existe dans le corps vivant, indépendamment du cerveau et de la moelle épinière differens foyers de sensibilitié où les impressions se rassemblent en quelque sort, comme les rayons lumineux, soit pour être réfléchies immédiatement vers les fibres motrices, soit pour être envoyées dans cet état de rassemblement, au centre universel commun."—Mem. vii. § ii.

rebellum is generically analogous in structure to the cerebrum (36); and, *à priori*, it appears unreasonable to appropriate so extensive a surface to acts, which, in many animals, occupy a most disproportionate portion of their existence. The natural history of its developement, its anatomy, and anatomical connections, and numerous physiological and pathological facts, furnish also irresistible proofs that Gall's doctrine is erroneous; and that the cerebellum is as compound an organ as the cerebrum.

114. That the cerebellum is connected with the involuntary system is evident from many facts; and that it is in some way connected with the phenomena of hysteria, is now a very prevalent opinion. These propositions, and its peculiarly central position with regard to all nervous structures, induce me to take it as a starting point.

115. The cerebellum is connected with the antero-lateral and posterior columns of the spinal cord inferiorly; and with the posterior lobes, optic thalami, (posterior cerebral ganglia,) and *tubercula quadrigemina* (optic ganglia,) superiorly.

116. Mr Solly thus arranges the fibres connecting the antero-posterior columns with the cerebellum. * There is a superficial and a deep set; one part of the superficial fibres cross the surface of the cord immediately below the *corpus olivare;* emanating from the *corpora pyramidalia*, and decussating with those of the opposite side.† Another portion takes the same direction posterior to the inner side of the *corpus olivare*, and form the outer part of the *corpus restiforme*, as they ascend to the cerebellum.

The deep set arise posteriorly, and are separated from the posterior columns by the posterior fissure.

118. The posterior columns in ascending to the cerebellum form a portion of the *corpora restiformia*, (which Mr Solly calls the auditory ganglia,) and are partly overlapped by, and partly interlaced with the fibres from the antero-lateral columns.‡

119. In addition to these, Gall states, that fibres from the anterior pyramids cross in the *Pons Varolii* at right angles to commissural fibres from the cerebellum; and decussate in the proper sense of the word.§

120. The *processus è cerebello ad testes* (the oblique intercerebral commissure) connect the cerebellum superiorly with the parts indicated, section 115.

121. According to Mr Solly, the fibres on the surface of the *processus è cerebello ad testes*, and the valve of Vieussens (which

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* Op. cit. p. 155.

† When hemiplegia occurs from disease of the opposite half of the cerebellum, may it not be explained by these decussating fibres?

‡ Op. cit. p. 225. § Ibid. Tom. i. p. 276.

is itself a ganglion,) may be traced distinctly to the optic ganglia.

122. The external fibres go first to the side of the optic ganglia, from thence to the posterior cerebral ganglia, and (Mr Solly thinks) to the hemispherical ganglia.

123. The deep or descending fibres interlace with the ascending fibres of the sensory tract; and then pass through the *locus niger* of the *crus cerebri* to become continuous with the motor tract, and also with the portion of the fornix which takes its origin from this point. Are these distinct from the fibres described by Gall? (119.)

124. These nervous connections must not be considered as being confined to the cerebellum, for they distinctly bring the posterior cerebral and optic ganglia into relation, not only with the cerebellum, but also with the external and internal peripheries. The connection of the respiratory ganglia with the latter structures, the cerebellum, and the posterior cerebral and optic ganglia, is next to be ascertained.

125. The respiratory ganglia are connected with the whole of the external periphery. Professor Müller remarks, that "the whole system of respiratory nerves can be excited to action by irritation of any part of the mucous membranes from the mouth to the anus, from the nostrils to the lungs;"* and Dr Marshall Hall makes the spinal nerves distributed on the skin to be excito-motory nerves of respiration.† This is nothing more than might be inferred from their natural history and comparative anatomy. (23, sqq.) The vagus in many animals, as Professor E. H. Weber has shown, supplies in great part the place of the sympathetic. This is the case in snakes, for instance, in which it is distributed to a great part of the alimentary canal. In the myxinoid fishes the vagus extends as far as the anus, and the sympathetic nerve is absent.‡

126. Sir C. Bell has described a lateral tract of nervous matter which he termed the respiratory, and which is in relation with the olivary bodies. This opinion has been very generally neglected; but whether justly or not may be doubted. If the doctrine just advanced be true, there must be some such tract composed of those nervous fibrils which connect respiratory ganglia with the external periphery; and I think it is now proved beyond question, that the olivary bodies are these ganglia.§ These bodies must also be the ganglia of the nutritive apparatus when we consider the distribution of the nerves with which they are connected. Consequently, if the inference in sect. 105 be just, we

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* Op. cit. p. 715. † Lectures on the Nervous System, London, 1834, passim.
‡ Professor Müller, op. cit. p. 726. § Solly, op. cit. p. 146. sqq.

must seek for the seat of the instinctive movements in parts having a close connection with the olivary bodies.

127. According to Gall, a considerable band (*fort faisceau*) of fibres proceed from the olivary bodies behind the grey matter of the *pons Varolii*, and between its transverse fibres into the *crura cerebri*, of which they form the posterior and inner part. After being increased in the *locus niger*, they ascend and form the posterior cerebral ganglia.* Previously to entering these some fibres have been observed to turn inwards, so as to give the *tubercula quadrigemina* their medullary investment, and to enter the valve of Vieussens. In other words, there are fibres connecting the respiratory, optic, posterior cerebral, and hemispherical ganglia.

128. Sir C. Bell does not appear to consider the bands springing from the olivary bodies as connected with the latter; he names them cerebral strands of sensation, being separated from the motor in the *crus cerebri* by the *locus niger*. Neither does Mr Solly adopt Gall's views; he describes the fibres as ascending principally to the outer side of the *corpus olivare*, and plunging into the *pons Varolii* to pursue their course to their appropriate ganglion, the posterior cerebral as stated by Gall.†

129. If we would have a right view of the functions of the optic thalami we must consider them as independent ganglia, just as the olivary bodies, and having their own special and independent relations. It is probable that the changes impressed on the external periphery of sensation undergo here some modification or combination previously to their final perception on the hemispherical ganglia. From various considerations I shall adopt the anatomical views of Gall, as exhibiting the nearest approximation to the truth, and consider it probable that the parts mentioned, sect. 127, are those through which the passions act on the respiratory apparatus, and the whole external periphery, (125.)‡

130. There are a number of conservative acts excited by impressions derived from the visual, auditory, and olfactory apparatus, and consequently there must be some connection between the nerves

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* Op. cit. i. p. 278.

† I think the anatomical views of Bellingeri throw considerable light upon this question. He considers the lateral portion of the antero-lateral column to be a distinct band, which he names the lateral strand. (Bell's respiratory tract.) Upon this the respiratory ganglia are placed, and from it, according to Bellingeri, the accessory nerve arises. (See Vol. xlii of this Journal, p. 392, 394.)

‡ Bellingeri advocates the doctrine, that the filaments derived from the lateral strands regulate the instinctive, involuntary, and organic motions, as maintained in the text. But he considers the restiform bodies to be the respiratory ganglia. This I think is disproved by numerous vivisections. In support of the view taken in the text, it may be observed, that the optic lobes in fishes are developed in an equal ratio with the optic nerves and olivary bodies. Dr Grant also agrees with Gall in stating that the latter chiefly form the optic lobes. Lectures in Lancet, ii. 1833–4, p. 553, and I think the opinions of Tiedemann are also similar.

of special sense distributed to them, and the nervous centres just indicated. This connection is obvious enough with regard to the optic nerves, but very obscure with respect to the olfactory and auditory ganglia. An analysis of the various uncertain statements respecting their anatomical relations would occupy considerable space with but an unsatisfactory result. I must, therefore, leave this part imperfect, with the hypothetical opinion, that some such connection must exist, and the hope that these opinions may lead anatomists to a new train of investigation. Physiological and pathological observations point out a close relationship between the optic, olfactory, and auditory nerves, and the organs of respiration.* Sounds induce hydrophobic gasp ; the action of light excites respiratory acts, (Vol. L. p. 337,) and some odours vomiting and dyspnœa.

131. If we revert to the doctrine, that all ganglia are formed upon the same type (30), and examine the anatomical connections of the cerebellum with other parts of the system as just given, with special reference to the functions of the spinal ganglia, as demonstrated by Hall, Müller, and Grainger, it would appear that the cerebellum corresponds in function to the posterior columns of the spinal cord, and the optic, posterior cerebral, and hemispherical ganglia (which must be considered extended surfaces (36,)) have the same relation to the cerebellum as the external periphery in connection with each spinal ganglion has to the posterior segment. In the latter case the movements of those muscles only which are in connection with the ganglion are excited, while in the cerebellum we have a ganglion in communication with the whole muscular system.

132. When suitable changes, then, are excited in the ganglionic peripheries just indicated, and propagated to the cerebellum, combined movements may follow analogous to the reflex.

133. Whether the cerebellum be the organ only of combined movements subservient to the conservation of the animal and the continuation of the species, and involving the whole muscular system, or whether it be the channel through which mental emotions act on the respiratory apparatus, I am not prepared to say. It is quite certain, however, that the passions do act through a channel different from that of the will, if it be granted, that when a nervous fibril is incapable of responding to a volition, it cannot be excited to action by a common mental emotion. Of this the following case is a pointed illustration.

134. A young married female, labouring under a disease analo-

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* I ought to state that I have traced a most unequivocal connection between the olfactory nerves and the optic commissure, in the form of a fasciculus of fibres stretching across the *substantia perforata.* Is it not equally distinct in every brain ? I have also noticed the appearance of a canal in the olfactory nerve.

gous to those I have been treating of, had palsy of the muscles of the face. She was unable to retain the saliva; while speech and the power to produce articulate sounds was completely lost; and she had no command over the muscles of the face. But the eyelids, although not under the influence of the will, closed involuntarily on the sudden approach of a body towards the eye. The patient smiled and laughed, and the muscular emotions thus produced were the same as those observed in the normal condition. The sound of her laughter, also, proved that the muscles of the larynx, although beyond the reach of volition, were capable of being affected by an internal stimulus.*

135. In this case we have, 1. The excitement of the will cut off by disease, corresponding to division of the spinal cord. 2. There is an internal or mental stimulus derived from the brain, corresponding to the excitant of reflex movements derived from without. 3. We have laughter excited independently of the will by this stimulus acting upon the ganglionic connection of the respiratory muscles. (57, 89.) Taking this case† and the anatomical details just given into consideration, I think we may fairly suppose that there is a communication from the seat of emotions (129), to the respiratory ganglia, independently of the will-fibres.

136. Whether this communication be through the cerebellum, or more directly, does not appear; but it will be at once seen that the preceding remarks are quite corroborative of the theory, that the cerebellum is the seat of combined movements, and which has been more or less acknowledged and advocated by Hertwig, Flourens, Bouillaud, Rolando, Foville, &c.

131. Many of the symptoms which consist in deranged muscular action, and the results of vivisections, are quite in accordance with this doctrine. Epileptic convulsions, chorea, and combined movements, as I have already shown, are all in close relation with each other. (Vol. L. p. 315, 331, 341.) Flourens found that rigors (a constant attendant on convulsive paroxysms, especially the hysterical,) and convulsions followed irritation of the *tubercula quadrigemina*. Extirpation of one of them caused blindness of that side and involuntary rotation—an observation confirmed by Hertwig and Bouillaud. Flourens gradually sliced away the cerebellum. During the removal of the first slices, only a little weakness and want of harmony in the movements occurred. As the experiment proceeded, disorderly and abrupt movements were excited; and the faculty of flying,

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* Recorded by Dr Magnus in Müller's Archives, 1837. See Br. and For. Med. Review, iv. p. 500.

† This is by no means a solitary case. Dr Alison states that he has met with several instances of the same kind; and quotes Sir C. Bell's Exposition, p. 212, and his Appendix to papers on the Nervous System, p. 120. The latter case was communicated by Dr Abercrombie. (Outlines of Physiology, p. 361.)

walking, standing up, &c. were gradually lost; and when the entire cerebellum was removed the animal was totally unable to perform regulated movements. Bouillaud makes the important remark, that the phenomena differ accordingly as the cerebellum is irritated or destroyed. If the cerebellum be only irritated, he says, its functions are not destroyed, but are thrown into confusion; and there are jumping, falling heels over head, whirling, and all the puzzling movements, (Vol. L. p. 342,) which are executed with such impetuosity that the eye cannot follow them. Sometimes the motions are like those of the epileptic. Majendie found that animals, when wounded in the cerebellum, made an effort to advance, but were immediately compelled to retrograde.

132. The last mentioned physiologist is much more remarkable for the number and variety of his experiments, than the accuracy or comprehensiveness of his inferences; and I think it is one of his errors to infer that certain parts of the brain subserve to movements in definite directions. These experiments are certainly much more in favour of Bellingeri's views of muscular antagonism. Section of a *crus cerebelli* cuts off the communication of the cerebellum with one-half of the body, and paralyses it; the opposite side consequently is not antagonized, and an instinctive muscular effort is concentrated upon the corresponding muscles, and throws them into violent action. It must also be remembered that the motor fibril, along which the will acts, are still uninjured; and this will modify the results very extensively. It is perhaps from loss of control over the muscles that we have the motion forwards in section of *corpora striata*, for our will acts as frequently to resist the instinctive movements as to assist them; indeed it is upon this power that moral responsibility is founded. It may also be remarked, that reflex movements are more readily excited in proportion as the mass of nervous matter is diminished, to which the peripheral changes are propagated. This is probably the reason why, when the spinal cord is divided in the loins, reflex movements are so much more readily excited in the lower extremities than in the upper, still in connection with the cerebral mass. Some thing similar may occur in separation of the spinal cord from the cerebellum.

133. Pathological anatomy confirms experimental physiology. Dr Foulmouche, in a paper published in the Memoirs of the Royal Academy of Medicine, gives many instances of horses having a total inability to move forwards, or an uncontrollable propensity to move on; these symptoms were connected with inflammation of the arachnoid covering the cerebellum, *medulla oblongata*, and *tuber annulare.* He mentions similar instances in the human subject, and adopts a modification of Majendie's doctrines. Andral mentions a case of cancer of the cerebellum, in which there was a

momentary retroflection of the head and trunk.[*] A man affected with rapid rotation of the head and paralysis died in the Hotel Dieu. He had a small tumour on the *tuber annulare*, which adhered to the cerebellum.[†] A child had a curious movement of the head alternately from right to left, and *vice versa ;* a cyst was found in the right lobe of the cerebellum, which contained numerous calculi.[‡] A child, aged 3 years, had a peculiar unsteadiness in walking, and want of control over its arms in attempting to lay hold of any thing. In the posterior part of each lobe of the cerebellum there were two tubercles of the size of walnuts, and the cerebellum was extensively softened.[§] Serres stated to the Royal Academy of Medicine, that, in four cases of chorea, he found the *tubercula quadrigemina* altered. An individual was unable to walk, there were frequent convulsions; and intelligence, respiration, deglutition, and articulation, were all imperfect. The *corpora olivaria* and *mammillaria*, and the *crus cerebelli*, were in a state of cartilaginous hardness.[||] A female, aged 35, had cephalœa, tremulous walk, and hysterical symptoms ; a tumour was found at the base of the cerebellum, springing from both lobes, and descending into the spinal canal as far as the sixth nerve.[¶] In twenty epileptic patients, there was not one in whom the cerebellum was not much smaller and softer than usual.[**]

134. Symptomatology furnishes us also with corroborative facts. Chorea is frequently accompanied by occipital pain, (Vol. L. p. 316,) and in most convulsive diseases, frontal headach is experienced, which is an almost inseparable companion of irritation of the cerebellum, or parts in connection with the ganglia of nutrition.

Those poisons which produce symptoms resembling those of hysteria act upon the same structures. M. Flourens has shown by experiments that belladonna acts on the *corpora quadrigemina* (Vol. L. p. 330,) and *nux vomica*, alcohol, the ethers, camphor, &c. on the cerebellum; each substance (according to him) leaving marks after death which distinguish the affected organ.[††] He confines the action of henbane, lactuca, and opium, to the cerebral lobes; but it is certain that opium acts on the whole nervous system, as is demonstrated by the state it induces in frogs analogous to that excited by strychnine. In a case of poisoning by *nux vomica*, related by Orfila and Ollivier, there was found much serous effusion over the cerebellum, and its structure was softened.* It is exceedingly probable that all poisons act upon the same structures. (108)

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[*] Lectures in Lancet, ii. 1836, p. 102.
[†] London Med. Gazette, xv. 143.
[‡] Andral, Clinique Med. v. 720.
[§] Dr Abercrombie, op. cit. p. 78.
[||] Ibid . Appendix, Case xviii.
[¶] Ibid. Case i.
[**] Greding's Med. Aphor. in App. to Crichton on Mental Derangement, ii. p. 425.
[††] Revue Med. Jan. 1824.

135. With regard to the special action of the generative organs upon the respiratory ganglia and their connections, I conceive it is exceedingly analogous to that of the foreign substances just mentioned. It is a natural agency, which (unlike the preceding,) is continuous and permanent. Hence permanent changes in the structures mentioned, Vol. l. p. 34, sqq.

136. There is, therefore, no special phrenological organ of physical love; and the cause of any preternatural developement of the passion must be sought for in some change in the generative organs, or the special ganglia with which they are connected. That a morbid state of these may excite a secondary morbid state in the nervous centres under consideration, is highly probable, and might, I think, be readily demonstrated. But poisons will produce the same. All the arguments in support of Gall's doctrine, which are based on the magnitude of the cerebellum, are inconclusive, because, in all animals, it is as proportionate to the activity of the vital movements of the system in general, as of the generative organs in particular. Compare, for instance, the difference in the magnitude of the cerebella of birds and reptiles with the difference in the number and complexities of the movements of conservation and reproduction exhibited by the two classes. In the one, the tending of the young requires the exercise of various powers; in the other, a hole is scratched in the sand for the egg. Men with large cerebella are as remarkable for the large developement of the muscular system as their sexual properties.

137. The sexual stimulus excites the whole system as much as opium or arsenic; and in frogs induces a state of tetanic sensibility, exactly similar to that excited in them by opium or strychnine; a circumstance which has been made available in conducting vivisections of these animals. I have already referred to one or two psychological phenomena resulting from this stimulus (Vol. L. p. 63;) in general it developes an exalted and pleasurable perception of the system of the rythym of sounds, colours, and time. The song and more brilliant colour of male birds have this sexual relationship to the generative instinct of the hen-bird; and we even perceive the same general law acting upon mankind. It is an observation of Lacon, confirmed by daily experience, that love makes many rhymers. The agency of the music and dance of the ball-room, on the sexual passion, is well known; and a homely proverb (which must surely be heretical) has linked the fair in the same breath with mackerel, in saying that they are caught by red. (Vol. L. p. 350, note.) There cannot be a doubt that there

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* Christison on Poisons, p. 642. 1st ed.

are psychical as well as vital stimuli of the action of which we are quite unconscious.

138. Having thus attempted to ascertain the seat of these diseases it only remains to inquire into their nature. It is very obvious that the term hysteria is altogether inapplicable to the varied forms of disease which I have made the subject of analytical investigation. The terms nervous diseases and nervous affections are equally vague, as we may readily discover by attempting to arrange them in their proper place, in the nosological systems of Linnæus, Vogel, Sagar, Sauvages, Cullen, Macbride, or Good.

139. We find, however, that they present two distinguishing characteristics: 1. an increased affectibility of the nervous system: 2. a morbid state of the blood. The former, perhaps, is most frequently dependent on the latter, but unquestionably, the affectibility is frequently a predisposing and exciting cause of the morbid state of the circulating fluid. *

140. The affectibility of the nervous system may be either local or general; it may be seated in the right or left half of the body; in a single ganglion, or in the whole series; or in nerves of physical, or of conscious sensation.

141. When the affectibility is local, its cause has only a limited sphere of action. Thus structural or functional disease of the liver will originate affectibility of the supra-scapular nerve, (Vol. I. p. 334,) of the skin corresponding to it, or of the right arm; so will disease of the heart excite affectibility of the sensitive points on the anterior and posterior median line of the thorax, (Vol. I. p. 323, note 325,) or of the nerves of the arm; so also will disease of the bladder affect the lumbar sensitive nerves. (88). In these and similar cases, it is of importance to observe that the diseased viscus excites a state of the spinal cord, so that the changes originating in the peripheral point of a sensitive nerve are magnified, as it were, when passing through the affected portion, on their way to the *sensorium commune*, (43). Physical sensation may likewise be thus exalted or diminished, (88); and this is the mode in which counter-irritants and other local remedies act when applied to the skin.

142. This principle admits of extensive application to diagnosis and therapeutics. For instance, an individual suffering from exhaustion and confined to bed, experiences diminished irritability of the bladder; there is no physical sensation excited, and it becomes painfully distended. Under these circumstances, a Lytta-plaster applied to the sacrum for half a hour, or an hour,

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* Perhaps good general terms for these diseases would be *neuræmia* and *neuræmious* (νεῦρον and αἷμα), restricting their application to the functional diseases of the nervous system, *dependent* on the efficient causes mentioned above, and comprising *hypochondriacal* affections. Greek midwives, according to Galen, were the first who used the term Hysteria.

will act upon the spinal cord, so as to excite such affectibility of both the motor and sensitive nerves, that the usual sensation shall be felt, and contraction of the bladder follow. It is by the same principle we can explain and make a correct diagnosis of the various local neuralgiæ and convulsions enumerated in my previous papers; and, lastly, it is by this principle that we understand how the ovaries excite those symptoms of hysteria connected with the dorso-lumbar portion of the cord.

143. There may be general affectibility originating in a morbid state of the sensory tracts just before they terminate in the cranial ganglia, or in the ganglia themselves; according to the principle laid down in section 43. A morbid state of the blood is, in the latter case, a cause of the general affectibility. It may also be the cause of local neuralgiæ, when a morbid local state is grafted on the general cachexy.

144. There is also a general state of the nervous system recurring at regular periods, according to some general law; when it is more affectible, and when, consequently, all causes of anormal motions and sensations act with more facility and energy. The most important periodic movements in the system are the quotidian and hepta-periodic.

145. The most obvious quotidian movement is indicated by the necessity for sleep, and the period of its continuance may be subdivided into two distinct portions. The first commences about midnight (sooner or later according to the habits of the individual,) and continues until two, three, or four o'clock in the morning; when the second portion begins and continues until six. During both these, the cerebral ganglia are affectible; but it is in the first that asthma and other paroxysmal diseases of the respiratory organs make their attacks; and in the second that cholera, asphyxia, and other intestinal affections commence.

146. The hepta-periodic movement may be observed in almost every disease; upon it is based the doctrine of critical days in fevers; it is clearly shown in all nervous diseases in which there are well-marked symptoms, and which do not affect materially the general health; but it is most distinctly marked in the phenomena of developement and reproduction.

147. The septennial phases of existence in man have been recognized by many observers, both ancient and modern, but numerous modifying circumstances render the observation of them difficult. It is in the phases of fœtal life that these periodic movements of the system may be best ascertained; and it is remarkable to observe, how invariably the transition from uterine to independent existence occurs in various classes of animals at hebdomadal periods or multiples. The following brief table of the periods of gestation and incubation in various animals illustrates this fact; and the list might be much more extended if naturalists

would be exact in noticing the time to the half or even a-fourth of a week.

1½ Weeks.	2 Weeks.	3 Weeks.	4 Weeks.	4½ Weeks.	6 Weeks.
Humming-birds.	Canary and other small birds.	Raven, hen, and most birds.	Duck, goose.	Rabbit, hare.	Ferret, cat, Swan.
9 Weeks.	4 Months.	5 Months.	6 Months.	7 Months.	8 Months.
Bitch, Isates.	Sow.	Lioness, ewe, Chamois.	Brown bear.	Porcupine.	Rein-deer, hind, Fallow-deer.
9 Months.	12 Months.				
Cow, Nylghau.	Camel, ass, mare, buffalo.				

147. The doctrine that there are mensual movements in man, as well as in woman, is rather ridiculed in England, but many continental writers have advocated it, and it was well known to the ancients. The same circumstances which have prevented a clear perception of the septennial movements, have also interfered more particularly in temperate climates to prevent us obtaining an exact knowledge of the mensual in man. It is however clearly marked in the hepta-periodic recurrence of various well-marked nervous diseases, as lunacy, epilepsy, &c. and in some hemorrhages.*

148. It is, however, universally acknowledged to happen in woman, because the menses present a visible sign of its existence, and one which cannot be confounded with any other. In the female of inferior animals the analogous hepta-periodic movement is accompanied by exalted sexual appetite, if the powers of the generative organs be not already divested to the nourishment of the young animal. In woman, this state of the system predisposes to conception as well as to attacks of the nervous affections I have endeavoured to illustrative. (144.)

149. Much stress has always been laid upon the state of the menstrual discharge, both by medical men and females themselves, and, in many instances, with very erroneous views of its relation to the general health. Its due flow indicates that the hepta-periodic movement is normally performed, as regards the uterus at least; and its suppression is a sign that the movement is deranged or irregular, but, I think, is rarely a cause of the irregularity, it being seated in the nervous centres or depending upon a morbid state of the blood. And so, also, when after suppression, the menses reappear, we are in error when we say the flow is the *cause* of the returning health; it is simply a *sign* that the periodic movement is normally performed; and, consequently, that the system has recovered its healthy tone. It therefore differs in no degree from other signs of returning health, as manifested when the secretions

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* It would be easy to fill two or three pages with references to cases of anomalous nervous affections, paroxysmal diseases, inflammations of various structures, and hæmorrhages, recurring every 42 hours or every 3½, 7, 14, 21, or 28 days, as well in men as women. Almost all treatises on nervous and intermittent diseases contain them. They are glaring instances of a general law, copious illustrations of which, I hope, ere long, to lay before the public.

from the kidnies, bowels, &c. become normal; only it is more tangible, more evident, and more observed from habit and custom.

150. The same remarks apply, of course, to other secretions. Suppressed urinary secretion in hysteria is not a cause but an effect of a morbid state already existing; although the retained urea may act secondarily as an injurious agent, and is also in other morbid states of the viscera. (Vol. L. p. 314.) These remarks are equally applicable, too, to profluvia. The secretion of flatus into the stomach is not a cause of disease but an effect of it. It occurs in all cases of local affectibility depending on visceral excitement, as by diseased heart. (141, and Vol. L. p. 326.) Illustrations of these principles I must leave to the experience of the reader.

151. The left half of the nervous system is more affectible than the right; and, of course, all the structures in connection with it are more liable to disease. A series of accurate statistical observations are only wanted to enable us to make this principle extensively available in practice. We may predict, for instance, that disease will appear in the left tonsil, left salivary glands, mammæ, or testes, sooner than in the right, in a person of cancerous diathesis. Some illustrations may be found in Vol. L. p. 44, 335. Numerical observations would furnish us with the laws which regulate the action of this principle.

151. The two ends of the spinal cord have some kind of antagonism. It would appear that the centrifugal action of mental emotions must necessarily be most exhibited on the parts in connection with the cranial cord, as it is the portion which is first affected, and which is in closest relation with the seat of the emotions. Illustrations of the connection which exists between the two ends of the cord, may be found in Vol. L. p. 310, and case of Hebditch, p. 328, note.*

152. As the cardiac symptoms of hysteria have not been noticed in this summary, before closing the paper I would briefly state that the heart is subject to the same laws as other muscular structures. The lining membrane is supplied with nerves of special physical sense, the powers of which are exalted or destroyed by nervine alteratives of every class. Paralysis of the nerves is the cause of death in many cases of poisoning.† The motor or white nervous fibrils of the heart are derived from the spinal cord as well as the sympathetic; and are analo-

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* In a case of neuræmious affection, (if I may be permitted to use the term,) recorded by Mr Cockburn in the forty-sixth volume of this Journal, this metastasis took place; and Dr Craigie notices the fact p. 32. There is a case in Med. Chir. Review, vii. p. 227, and another related by Dr Abercrombie, op. cit. p. 73. With reference to the remarks in the text, it may be observed, that in the entomoid classes, the last abdominal ganglion is frequently as large as the supra œsophageal or cerebral.

† Professor Müller makes some interesting observations on this subject, op. cit. p. 735.

gous in structure to spinal motor nerves. (Müller). The heart being developed from the vascular layer of the embryo (which is derived from the serous and mucous layers,) it must partake in some degree of the properties of both the voluntary and involuntary systems. It is thus, that, like portions of intestine, the heart acts after removal from the body, and thus, also, that a motor excitement traversing the spinal cord is propagated to the heart. We have consequently increased cardiac action commensurate with the excitement in the nervous centres; and it is thus that the pulse is quicker when standing than lying; the muscular efforts being greater in the former than in the latter posture.* Without indulging in numerous illustrations, we may confidently infer that the laws of affectibility are as applicable to the heart, *mutatis mutandis*, as to other sensitive and motor structures.

153. The question may be asked, what are the efficient causes of this affectibility? To answer it, we must first have ascertained the nature of the changes excited in the nervous system by will and force, (33, 55, 56); the bio-chemical laws regulating vital mechanics; and the mutual action of the blood and neurine on each other. But although at present the question cannot be solved, we need not despair of success. We are but beginning to apply the power of physical science to the investigation of vital laws; yet we have already conquered vast difficulties. The opinion of Ehrenberg, that the decolorized globules of the retina and similar parts, (36), are formed directly from the blood globules, is curious.† Close microscopic observation of the changes produced in the blood-globules and the ganglia by nervine alteratives, would lead to important results; and afford a clue to the discovery of those originated by external and internal stimuli. The consideration of these subjects, and of the supposed remote causes of affectibility, as irregular distribution of the nervous fluid, congestion, irritation, &c. I leave to others.

154. In conclusion, I may be permitted to express my regret, that this paper should contain so many hypothetical views. However, I trust the reader will give me credit for attempting to apply them as much as possible to their legitimate use; namely, the orderly arrangement of facts. He will also consider that they have partly originated in our still very imperfect physiological knowledge; and I am not without hope, that he will find the principles I have advocated to be capable of daily application to the diagnosis and treatment of nervous affections in general.

York, 10*th October* 1838.

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* For recent notices respecting the alteration produced on the pulse by posture, &c. the reader is referred to Professor Müller's work, p. 741, and Dr Guy's paper in Guy's Hospital Reports, No. for April last.

† In the forty-eighth volume of this Journal, p. 288.

ART. V.—*History of a singular Convulsive Disease, affecting Five Children in one family.* By ANDREW DEWAR, Surgeon, Dunfermline. (Read before the Medico-Chirurgical Society of Edinburgh, 3d April 1839.)

ON Saturday, the 23d of February 1839, I visited, in the parish of Saline, the family of Mrs Hamilton, when I learned the following facts.

On the evening of the 22d of December last, Elizabeth Hamilton, aged 8 years, was suddenly seized with drowsiness, followed by torpor of a few minutes duration, during which she fell to the ground, her body remaining rigid and immovable. The attack was of short continuance, and the girl awoke from it, as from a profound sleep, her general health, sensibility, and intelligence, being to all appearance unimpaired. She was wholly unconscious of the attack, and immediately returned to her play, as if nothing had happened to her. From this time, the fits returned frequently every day, their frequency and severity increasing in the evening. The approach of the fit was indicated by slight flushing of the face, and difficulty of breathing of a few moments continuance.

Thus the disease proceeded for four days. On the fifth, her elder sister, Margaret Hamilton, aged 16 years, was affected exactly in the same manner as Elizabeth, and on the fourteenth day, her brother, John Hamilton, aged 12 years, was likewise seized. In no way, it would seem, did the attack vary in any of the children, except that in the boy, the difficulty of breathing, or rather the extreme rapidity of breathing, was more remarkable, the rigidity greater, and the fits more prolonged. About a week after the boy became ill, a girl, 6 years of age, and shortly after her, an infant 13 months old, were in like manner affected. In these two, however, the attacks were throughout less frequent, and much less severe. The only one of the family who escaped was a girl about 3 years of age.

For three weeks the disease continued, apparently without any change, the fits attacking the three eldest children many times every day, and frequently the whole three being simultaneously affected.

About this time the aspect of the disease underwent a remarkable change, the cataleptic state being exchanged for the most violent gesticulations, and surprising muscular activity. It was in the boy that these extraordinary gesticulations first exhibited themselves, and in him the fits continued longest, and were most severe. This state of matters had lasted for about three weeks when

I first saw them; but, to avoid repetition, I shall endeavour to describe the fit which I witnessed on the afternoon of the 23d of February.

I arrived at their dwelling about the time of the day at which the fits usually recurred, and waited for nearly two hours, in vain, in the hope of seeing a fit, of which I had already heard, and the descriptions of which I regarded as extremely exaggerated. Suspecting that my presence might perhaps prevent the accession of the fit, I withdrew, and was no sooner gone than the eldest girl was seized, and I was instantly recalled.

She was seated by the fire beside the rest of the children, when, without any very obvious warning, her head dropped on her breast, and she seemed for a few moments as if asleep: presently her breathing became incredibly rapid, her face flushed, her eyes became prominent, the expression of her countenance animated and wild. In less than a minute she started to her feet, ran with great velocity from one end of the house to the other, leaped on and over the chairs, threw herself at one spring on the top of a chest of drawers, struck her head several times against the roof of the room, descended without delay again to the floor, from which, on alighting, she rebounded like a ball, three or four times perpendicularly to the height of several feet; now she threw herself on the ground, and, stretched at length, rolled over and over from left to right, when, stopped by the wall, she instantly turned and rolled from right to left; presently the movement changed, and she revolved heels over head with inconceivable velocity; now she attempted to "stand upon her head," but fell down, somewhat violently, stretched at full length, and rigid. In this posture she remained perhaps half a minute, and by an extraordinary movement, apparently without bending a joint, she regained the erect position, and remained for nearly a minute immovably rigid; again she ran with unnatural speed through the house, frequently attempted to climb the walls, tore with her teeth the clothes of those who stopped her progress, twisted and contracted herself into endless forms, until, after twenty minutes of these extraordinary gesticulations, she suddenly, while standing, threw herself backwards, her feet remaining on the floor, her body being bent into an arch, and her head not more than three inches from the ground. There fixed for a few moments she remained, when, recovering the erect position, both legs were, on the same instant, drawn forcibly up against the thighs, and she fell forwards on her hands and knees: after hopping two or three times in this posture, she sunk down, and remained for a few moments, her whole body being extended, except the legs, which were still firmly flexed upon the thighs.

Thus ended the fit. She was carried to a seat, and in less than a minute was perfectly collected, looking around her without any apparent illness or fatigue, and snatched from her sister, and claimed as her own, some plaything which she had dropped in the commencement of the attack.

Such was the fit which I witnessed, and I was assured that in this manner it had exhibited itself for three weeks. The violence and duration of the attacks varied considerably; they were always slight in the early part of the day, but became much more severe towards evening, and, on some occasions, were scarcely absent from five o'clock in the afternoon till midnight, and in two or three instances, till three o'clock in the morning. Sometimes one of the children only was affected at once, but more frequently when one became ill the others were immediately seized, and it was observed that they all practised the same movements, or performed the same evolutions, at the same time.

Nothing satisfactory could be learned respecting the cause of this very remarkable affection. The children had been hitherto remarkably healthy. On the most careful inquiry I could not learn that any of them, previous to the attack under which they laboured, had ever witnessed any convulsive disease. In the month of November their father died of some febrile complaint, and subsequent to his death, their mother had been for a considerable time confined to bed from some chronic ailment, respecting the nature of which I had no opportunity of being informed. Besides, in the beginning of November, the family had taken possession of a newly built house, the walls of which even in the end of February, when I visited the place, were perfectly wet. What effect the unwholesome dwelling, and the privations to which the children were necessarily exposed in consequence of the sickness of their parents, had upon them, I shall not pretend to determine, but nothing else could be learned which could in any way account for the singular disease with which they were afflicted. Indeed, at the time I visited them, they denied that they suffered any uneasiness, and the general functions seemed scarcely, if at all, affected. They ate well, perhaps too well, and slept soundly for many hours in the morning. The bowels were said to be freely and frequently moved, and in the forenoon they amused themselves with almost their wonted vivacity. The secretion of the kidneys was the only one particularly affected. On the cessation of every fit there was a pressing call to make water, but at all other times, the function was perfectly natural. In its external character the urine seemed healthy. It was not albuminous. In Elizabeth (the girl first seized) the pulse was 100, in the others it was of the ordinary frequency. In all of them the flesh felt soft, and the expression of the countenance was unintelligent, and certainly less animated than is usual in children of their age.

I was satisfied that in Elizabeth alone the disease could be regarded as an idiopathic affection, and that in the others the symptoms were wholly the result of imitation. If this opinion was correct, it was obvious that it was almost impossible that they could be cured while they remained together, and that while the one must in all probability undergo a regular course of medical discipline, the others might possibly be cured by moral treatment. With these views, as their residence was eight miles distant from mine, I recommended that they should be sent to Dunfermline, and that a lodging containing several apartments should be procured for their accommodation. It was so arranged accordingly, and on Wednesday the 27th of February, the boy and the two eldest girls were placed more immediately under my care; the two youngest ones being comparatively but slightly affected, it was hoped, might readily recover when separated from the rest.

The whole of Wednesday passed over without any fit, which had not happened for eight weeks before, until about ten o'clock at night, when the eldest girl became affected, and I saw her immediately. The fit differed in nothing from that which I have already attempted to describe, except, as there was no furniture in the apartment on which she could ascend, she made incessant attempts to climb the walls. The fit lasted about a quarter of an hour, no drowsiness or stupor followed; she instantly recovered perfect sensibility and consciousness.

While the girl was running about the room, I observed the boy tremulous and agitated, but, by keeping my eye upon him, I perceived I could in some degree control the accession of the attack. The girl, however, had scarcely sat down, when his breathing became rapid, and he was just starting to his feet, when I roused him to attention by sternly assuring him, that, if he moved from his seat, I would instantly plunge him in a vessel of cold water, which I had prepared for the purpose. The impending fit immediately ceased, and he became calm and composed. After warning all of them that the slightest movement would be followed by an immersion in the pail, the night passed over without farther ado. Next morning, they were placed in separate apartments, and they were assured that they would be plunged on the slightest appearance of a fit, and they were encouraged with the promise of a trifling reward, if they behaved well till the next morning. The nurses were instructed to souse effectually, if necessary, the boy or the eldest girl, but not the youngest for the present, but, of course, to keep her in ignorance that she was to be spared: and they were farther instructed, that if a plunge was necessary, it should be inflicted in the presence of the rest. The next twenty-four hours passed without a tremor, and they were frequently reminded of their penny or their plunge. On the afternoon of the third day, the eldest girl was again seized, and she was without delay immersed in the bath in the presence of the rest. The fit immediately ceased. Next day she was again affected, was bathed, and with the same result. From this time she had not even the slightest threatening of an attack. After five days, the boy and his eldest sister were allowed to inhabit the same apartment, and all went on well with them until the evening of the ninth day, when the boy became drowsy and his breathing rapid, but the fit ceased while they undressed him for the purpose of plunging him in the bath. Being apprehensive lest the fear of the immersion had worn off, I took with me a cauterizing iron, and explained to them the manner in which I meant to sear their necks, in case either of them should become affected, and the nurse was desired to keep it constantly in the fire, that it might be in readiness. The iron was kept red-hot for several days, and it had the desired effect. I need scarcely say, that I had no intention of using the iron. I was convinced that the disease could be cured by moral treatment alone; but it was necessary, in order to effect it, to keep up an impression on their minds stronger than the morbid habit. No medicine was given except, twice, a compound colocynth pill to each. Their diet was oatmeal porridge and milk, barley-broth and bread, and occasionally a little meat at dinner.

On Friday the 22d of March, the girl, aged 6 years, was brought to Dunfermline. She had several fits after the others left home, and had been repeatedly immersed in cold water, but the result was not perfectly satisfactory. I showed her the pail filled with water, and the cauterizing iron, and explained to her how I meant to use them, if she became ill. From that time she has not exhibited any symptom of the disease.

The infant had two or three slight attacks after being separated from the rest; but they readily ceased after immersion in the bath.

The progress of Elizabeth was very different from that of the others. For upwards of two days after coming to Dunfermline she continued quite well; but on the afternoon of the third day she was affected in the same way as in the beginning of the illness. She became suddenly drowsy; her head fell forward on her breast; her breathing was rapid; and she would have fallen unless supported. She seemed in a profound sleep; her limbs were stiff, and remained while the fit lasted, in whatever posture they were placed. This state continued for a few minutes, seldom longer than five. She immediately recovered her sensibility, being altogether unconscious of having been ill. As soon as the fit was observed, a pitcher of cold water was poured over her head, but without any effect being produced by it. Her head was shaved. The scalp was hot to the touch, and she complained of pain in the back part of the head, extending downward towards the neck. Her pulse was 110, and firm; her tongue white and slimy; bowels open, and the secretions natural. A few ounces of blood were taken from between the shoulders by cupping, and a blister was applied to the nape of the neck. The bowels were freely opened by calomel and compound powder of jalap. The fits now returned very frequently, from ten to twenty in a day. Tartar-emetic ointment was rubbed all over the scalp and spine, and a plentiful eruption followed, while the bowels were purged daily with calomel and jalap, or with the compound colocynth pill, but without any good effect. On the evening of the 10th of March she had a fit, much more severe than any which had occurred since she left home. The attack came on as usual, with drowsiness and quick breathing, and she was laid upon the floor. After remaining perfectly still and rigid for a short time, she erected her body into the form of an arch, her head and heels alone resting on the ground, and in this posture moved slowly round three or four times. Suddenly she was bent in the opposite direction, her head and feet being raised, and the centre of the spine alone in contact with the floor, and now, for about the space of a minute, she spun round like a top, with amazing rapidity. I accidentally happened to be present during this fit. On the following morning I resolved to try the effect of the caustic ammonia, as a counter-irritant. A piece of cotton, about two inches square, wet with the strongest *aqua ammoniæ*, was applied to the newly shaved scalp, and ordered to be repeated three times every day, either upon the head, or between the shoulders. The effect was remarkable. From that hour, all convulsive movements ceased, except one slight threatening, which the application of the ammonia immediately removed. To guard, however, against the risk of a relapse, the ammonia was applied to her head or neck every day, for nearly a fortnight. As her bowels were perfectly natural, she took, for the present, no farther medicine, except occasionally one laxative pill at a time. Her diet was simple, viz. porridge, bread, milk, barley-broth, and latterly, a little animal food.

For eighteen days, from the first application of the ammonia, she had no complaint of any kind, and her appetite and general appearance were greatly improved. On the morning of the 19th day, she took breakfast heartily, and was amusing herself as usual, when of a sudden she complained of some uneasiness in the back of the head, extending downwards along the spine, and, at the same moment, her right leg was strangely distorted, the outside of the thigh and leg being fairly turned forward, the knee half-bent, and the toes turned inwards. She had little pain, except when an attempt was made to bend any of the joints, which I could not effect, even by using very considerable force. She could walk, but with an odd hobbling gait. Her pulse was 100, and her appearance much altered. A brisk dose of the compound powder of jalap with calomel was given as soon as I saw her, (which, in consequence of my absence, was not until twelve hours after the attack,) and the caustic ammonia was freely applied to the spine. No sooner had the counter-irritant begun to take effect, (about ten minutes,) than the limb recovered its natural appearance, and she walked without the slightest impediment. The bowels were not moved for upwards of twelve hours, and it required three doses of the compound powder before their movement was affected. From this time she had no further symptom of the disorder. Two compound rhubarb pills were given, every second night, as a supposed security against unpleasant consequences. She has continued till the present time (12th of April) perfectly well.

The symptoms exhibited by these children cannot correctly be referred to any single disease hitherto defined by nosologists. In them we had, almost at the same moment, or at least passing into each other in rapid succession, symptoms which have been regarded as characterising catalepsy, tetanus, and a state more nearly resembling chorea, than any other disease we are acquainted with. Yet assuredly the motions were not "involuntary," for the agility with which the children sprung from one place to another, was not more extraordinary than the precision with which the motions were performed.

Here it may be remarked, in passing, how inconclusive, more especially in convulsive diseases, are any inferences drawn from the symptoms alone, as to the nature of the organic cause in which they may be supposed to originate. In Elizabeth it cannot be doubted that the disease was the effect of some cerebral irritation; in all the others, any affection of the brain or spinal cord, if it existed at all, was not the cause, but the consequence of the disease.

The power of imagination in propagating convulsive disease has been long known. The subject, even since the time of Lord Bacon, has been regarded as curious and interesting, both to the science of morals and of medicine; and many facts are now upon record, which prove satisfactorily that persons of sensitive constitution, and more especially at the susceptible period of childhood, unconsciously and involuntarily imitate the awkward and ludicrous movements of their parents or associates; that by yielding to feelings at first comparatively slight, and perfectly within the command of the will, they at last acquire habits beyond the power of their reason or their most strenuous exertion to restrain; and that, under the impulse of a more powerful cause, they have exhibited convulsive paroxysms, which could not, from any of their external characters, be distinguished from epilepsy. So irresistible, indeed, is the power of habit, that persons have brought on fits by pretending to have them, and, to their dismay, they have found themselves unable to suppress those violent muscular movements which they had at first assumed, but were now unable to control. It was in this way that the disease, absurdly called "leaping ague," spread over some districts in Scotland and Wales, and it is on the same principle that we are to account for the convulsive movements which agitated the religious enthusiasts at Cambuslang, and more recently in America.

That the disease I have described was propagated in the manner I have alluded to, can scarcely admit of a doubt. It is surely unnecessary to shelter these poor children from the charge of imposture. It is gratuitous to suppose imposture without an object. They lived in a sequestered situation, with few to astonish by their remarkable feats, they had nothing to expect, and received nothing for their performances; and, in truth, could not be seen under the fit, but by stealth, for the presence of a stranger invariably prevented the accession of the attack; and the extraordinary movements they were utterly unconscious of ever having performed, and incapable even of imitating, far less of equalling, in the absence of the excitement.

In Elizabeth, it is probable, that the disease originated in some affection of the brain, that the sight of the fit produced upon the other children, successively, an unconscious imitation of the actions of their sister, until, the habit once formed, the convulsive movements were every day more and more easily excited, in the first instance, by witnessing the attack and very soon without any obvious exciting cause at all. That the disease was thus induced, is farther proved by a singular fact which was observed in the youngest, an infant of thirteen months old. After the disease had continued for some time in the older children, the infant was noticed to have its attention arrested by the attacks of rapid breathing and somnolency in the others, and soon began to breathe quickly and close its eyes, and immediately to look up, as if in sport, but before many days the fits of breathing and drowsiness came on at times, when none of the rest were affected, or even became a signal for the accession of the paroxysm in the whole of them.

At the commencement, it cannot be supposed, that an organic cause (except of course in Elizabeth,) had any share in producing the disease; but it can scarcely be doubted that the brain speedily suffered from the sympathetic irritation, and that very probably organic lesion of some part of the nervous system would ere long have taken place. The truth is, that all the children exhibited a marked lethargic and fatuous expression of countenance, and this peculiar expression was at least as remarkable in the boy and eldest girl, as in Elizabeth, who suffered from an actual disease. The facility, too, with which the disease was cured, and its cure by moral treatment alone, in all those whom I have supposed to be affected by imitation, is sufficient to prove that it had not its origin in any internal cause. The circumstance of the fit having been prevented from coming on in the afternoon, when I first visited the children at their mother's house, gave me a glimpse, as I thought, of the means by which the progress of the disease was to be arrested. It was necessary that a strong impression should be made upon their minds, and maintained for a sufficient length of time, to break through the morbid habit by which the disease was perpetuated. This I expected to effect by the threat of the cold-bath, or by an actual immersion in it if necessary; an expedient of the safety of which I had no doubt in all those who were sympathetically affected, but of doubtful efficacy in the girl who laboured under the real disease.

It was interesting to observe the effect of the threat. A disease which had recurred many times every day for eight weeks, and had sometimes continued, with scarcely any intermission, for six or eight hours, was instantly arrested for two days, and, after returning twice in the eldest girl at some interval, was finally extinguished by two immersions in the bath. On the boy, the effect of the threat was instantaneous; and the witnessing the discipline inflicted on his sister, exerted an influence so salutary, as effectually to check in him all convulsive movements for nine days. A slight threatening of a fit at this time led me to substitute a red-hot iron for the cold bath, and the effect was complete. In order to ascertain exactly the influence of the moral treatment, I abstained entirely from the use of medical remedies for a considerable time after the fits had ceased. During the second week of their residence in Dunfermline, they each took one compound colocynth pill, and during the third week another pill, for the purpose of obviating the effects which confinement within doors had produced. From this time they were allowed to go abroad, and no farther medicine was required.

The influence of strong mental emotions on nervous diseases has been long, though not generally, understood; it has ever been the favourite field in which quacks, ecclesiastical and medical, in all ages, have so successfully expatiated. But one might very reasonably have thought, that the clear light which has been thrown upon this subject of late years would have disabused the public mind, and driven the charlatan from his stronghold. Yet we have, in these very days, displayed before us, the deceptions of Homœopathy, the delusions of Rowite miracles, and the oft exposed juggleries of Mesmerism. It is to the influence of imagination, on diseases unconnected with organic causes, that we are to look for the only rational or philosophical explanation of these ignoble pretensions. How easy it would have been by a few grimaces of the quack, a few mesmeric passes, or a few superstitious mummeries, the underplot, in the form of a red-hot iron, or whatever else was fitted to produce a strong mental impression, being sedulously kept before the view of the patient, and out of the view of the public,—how easy, I say, it would have been to have cured these children of their sympathetic disease, and thus have helped to bolster up a system of error, abhorrent to science, disowned by reason, and degrading to religion.

The effect of the moral treatment on Elizabeth was more remarkable than on any of the rest. Such was the influence of the admonition she received, and of the immersion of her sister in the cold bath, that the disease, though dependent on a positive organic cause, was, after having existed eight weeks, entirely suspended for nearly three days. The disease, however, as was to be expected, returned, and procceded unabated, in spite of local bleeding, very active counter-irritation, and the daily administration of purgative medicines. It immediately ceased on the application of the caustic ammonia. I have not found the " pommade" of Gondret, or the aromatic refinements of Dr Granville any improvement, and I merely employed the strongest *aqua ammoniæ* of the shops: a remedy in which I have long had great confidence, and which I have applied hundreds of times within the last twenty years. I have always found it a most effective and very manageable form of counter-irritation.

In this instance, purgatives, even when administered in large doses, and acting vigorously, failed in producing any mitigation of the symptoms. I have had occasion to see nearly fifty cases of chorea. At this moment, besides the five children who form the subject of the present communication, I have four cases under my charge. All that I have seen hitherto have recovered; but I regret to say, that the plan of treatment *by purgatives alone*, as recommended by Dr Hamilton, has often failed in my hands. I shall not presume to question Dr Hamilton's theory, that the peculiar convulsive motions " depend upon previous and increasing derangement of health, as indicated by irregular appetite, and constipation of the bowels, " and that the irritation originating in this disordered source is communicated to the brain and spinal cord, giving rise to an irregular and unhealthy distribution of nervous influence. But no fact is better known, or more deserving the consideration of the practical physician, than that irritation of the brain, or indeed of any organ in the animal economy, when long continued, becomes independent of its cause, is speedily associated with an increased action of its vessels, exists as an actual local disease, and by a reflected operation, recalls into existence, perhaps, that very disease, from which it, at first, derived its origin.

That such is the history of a great proportion of the cases of chorea which have continued long, I have no doubt. The function of the alimentary canal is, probably, first disordered; the nervous system is irritated; the irritation excites to a disease of structure; and an intractable ailment in the digestive organs is the consequence of this once secondary, but now independent disease in the head. With this principle before us, we can easily account for the very different results of treatment in cases of chorea. When the disease has lasted only for two or three weeks, the daily administration of purgative medicines, in moderate doses, readily effects a cure. But it is far otherwise when the disease has continued for months; for purgatives given " till the movement and expulsion of the accumulated matter are effected" are not sufficient for the removal of the disease. For this purpose " powerful purgatives must be given in successive doses, in such manner, that the latter doses may support the effect of the former," not, however, with the intention of merely expelling "the offending mass,"—not, merely for the purpose of correcting the disordered state of the secretions from the intestinal mucous membrane, but by their powerful revulsion, relieving the increased action going on in the brain, by the reflected irritation of which, the disorder in the digestive organs is maintained. If we analyse Dr Hamilton's cases we shall find, that the immense doses he was accustomed to prescribe, were not fitted to correct disordered function, by soliciting healthy secretions into the bowels, but by stimulating the whole intestinal surface, powerfully to diminish the mass of the circulating fluids, and produce a most effective counter-irritation. The manner too in which his purgatives were administered, (the large doses being divided into smaller ones, and given at short intervals,) was well calculated to prolong the excitement of the mucous membrane, and eminently to extend their revulsive operation.[*]

I was trained in early life to entertain the most profound respect for Dr Hamilton's professional attainments, and shall ever cherish the utmost reverence for his justly venerated name; and in the commencement of my professional career, pursued, with undoubting confidence, the plan which he has so luminously delineated. But I soon found, as indeed might naturally have been expected, that, in obstinate cases, the long-continued exhibition of "powerful purgatives" is apt to awaken those sympathies which are so intimately associated with the alimentary canal, and even to produce a degree of irritability of the mucous membrane, which does not readily subside. The latter consequence I have repeatedly had occasion to observe. I have seen the convulsive movements of chorea removed by the daily use of "powerful purgatives," but leaving behind a red tongue, a sensitive stomach, and irritable bowels, which it required on the part of the patient, years of self-denial to remove.

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[*] Lest it should be thought that I have misrepresented Dr Hamilton's pratice I subjoin the following facts from his own work.

Anne Ross, 10 years of age, took on the first *five days* that she was under Dr Hamilton's care, fifty aloetic pills; similar treatment was continued for twenty seven days, when the cure was completed by giving her, in *five days*, eight drachms of jalap, and 30 drachms of Rochelle salts.

Elizabeth Webster, 9 years of age, took on the (1st day) 15 grains of calomel and 6 drachms of Rochelle salts; (2d day) 15 grains of calomel and 6 drachms of tincture of jalap; (3d day) two scruples of jalap; (4th day) two scruples of jalap; (5th day) a drachm of jalap and 2 grains of calomel, &c.

Nelly Parker, 12 years of age, took on the (1st day) a drachm of jalap; (2d day), 24 aloetic pills; (4th day) 12 pills; (5th day) 12 pills; (6th day) 12 pills; &c. &c.

It cannot be said that these immense doses were given because the purgative effect did not follow, for they were repeated (see case of Webster *ct passim*) when their operation was powerful, even to the extent of ten motions in a day.

With these impressions, I have, for many years, desisted from the administration of purgative medicines in large doses, my object being to evacuate the contents of the bowels, and restore healthy secretions, and by counter-irritation applied to the head and spine, more or less severe, according to the urgency of the case, endeavour to relieve that affection of the brain by which, I believe, in all cases of considerable duration, the disorder of the digestive organs is perpetuated. By this mode of treatment, I have, for many years, found chorea a much more manageable disease than my early experience would have warranted me to expect.

Dunfermline, April 12, 1839.

Art. VI.—*Illustrations of the Principles of Surgery.* By Alexander Watson, F. R. C. S. E., Surgeon to the Royal Infirmary of Edinburgh. Part I.

Preliminary Remarks.—Surgery was long practised in this country, and in other parts of Europe, as a subordinate branch of medicine or the healing art. In these times the scope of surgery was limited,—its resources were few,—and its practice was confined to surgeon-barbers, who acted under the direction of the physician. The business of the surgeon-barber was, therefore, entirely a mechanical art, consisting of manual operations when required, and medical education was confined exclusively to the physician.

In this country, however, surgery no longer acknowledges medicine as her mistress,—she has broken the chains of servitude, and has raised herself to be dictator in her own province,—the treatment of diseases requiring manual operations. The surgeon no longer acts in humble subserviency to the physician, and has taken the study of anatomy, physiology, pathology, as well as the conduct of operations into his own hands, in order that he may cultivate, improve, and practise this branch of the healing art for himself. By this advancement, the surgeon has not only greatly improved his own special department of the profession, but has added to the healing art many resources formerly unknown.

The increased attention devoted to medical education, and especially to surgical anatomy, have given a new impulse to the study of anatomy and operative surgery. But so much importance is attached to the latter, by certain teachers and practitioners, that students seem led to believe this to be by far the most useful and important branch of the healing art.

This very evil was complained of, as existing about thirty years ago, by the late Mr John Bell, one of the most talented surgeons that ever practised in Edinburgh. " Operations," he says in his Lectures, " usurp an importance in surgical education which they should not naturally have. Operations have come at last to represent, as it were, the whole science; and a surgeon, far from being valued according to his sense, abilities, and general knowledge, is esteemed excellent only in proportion as he operates with skill." Again he says, " the passion of acquiring character in operations is surely full of danger; it is fit for those only to possess, who have no higher claim to public esteem." The remarks of Mr Lawrence of London upon this subject are worthy of the most careful consideration. " Let me take this opportunity of observing, that the performance of operations is often the least important part of the surgeon's duty, even in cases requiring them. To judge whether a complaint is curable by other means; to perceive when an operation is advisable, and to determine when it becomes necessary; to prepare the patient for it, and to manage the case well, after the operation has been performed, are points of equal, and often superior, importance. I do not mean to speak lightly of operations; it is quite necessary that you should carefully study this branch of surgery, and prepare yourselves for operating on the living by cutting the dead. But you must not attach the first importance to a description of duty which you will be very seldom called upon to execute. It is a great mistake to suppose that any surgeon is principally employed in operating. It is the boast of modern surgery to have greatly diminished the number of operations."—Lectures on Surgery, p. 10 and 12.

In a late publication by an eminent surgeon he thus writes. " A fondness for certain operations, and a degree of over zeal in seeking for occasions to perform them, are modern traits of professional character, which, it is to be hoped, will become obliterated and obscured by the daily improvements in the pathology and diagnosis of diseases. The mere operator ought not to be ranked amongst the best surgeons, and the kidnapping of such patients as furnish conspicuous cases for an hospital theatre, or for the more private assembly of a coterie of young operators, should be discountenanced and denounced by every conscientious cultivator of surgical science."*

There can be no doubt that, to amputate a shattered limb,—to apply a ligature to a wounded artery,—to raise a depressed portion of the skull from the brain,—to divide the stricture in strangulated hernia,—or to remove a cataract from the eye, with success, and many other similar operations, are proud achievements of our art,—operations highly beneficial, and worthy of the most earnest attention of the surgeon. But operations for the removal of malignant diseases, or those which have their origin in the constitution, are far from generally proving satisfactory.

In many cases the performance of operations is the most dazzling, but it is also the most unsatisfactory department of the profession. How many patients die from capital operations, though performed in the most perfect manner, and apparently under the most favourable circumstances? In how many who survive does not the disease return after the utmost care of the surgeon to extirpate it? And how many operations, though well performed, fail in accomplishing their intended object? It is no matter of surprise, therefore, that mankind should feel horror at the surgeon's knife, which has so often inflicted pain and mutilation without advantage. The pain and danger resulting from the operation are certain; but, in many cases, the benefit is very doubtful. So that mankind seem, as if instinctively, to shrink from the very name of operation.

Considerations such as these, have induced the ablest and most experienced in the profession, to attach much less importance to the operative part of surgery than is done by the junior and less experienced division. And the circumstances to which those, to whose opinions we look up with greatest veneration and respect, attach most importance, are the study of anatomy, physiology, and general pathology; because these form the only true and sound basis for the superstructure of the healing art, which cannot change by time or fashion, and upon which every improvement has been, or can be, founded. The opinions formed by the study of these departments, together with experience, are the only safe and proper guides in deciding all difficult and important questions which occur in practice; and he who is guided solely by a correct and proper knowledge of them, in the discharge of his duty, will never have cause either of regret or self-reproach.

Fortunately, however, the cultivation of morbid anatomy and pathology has done much to lessen, to a very surprising extent,* the number of really necessary operations, not only by pointing out more rational means of curing diseases, but also by showing the impropriety of resorting to operations, in many cases, where the general system is either the source of the local disease, or is so much affected that success is hopeless; and, consequently, that operation, in such cases, is cruel as well as absurd. The increased attention, also, which is devoted to the study of anatomy and surgery, is rendering every surgeon quite competent to the performance of all the ordinary operations of surgery, both from their greater simplification and being better understood.

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* Retrospective Address upon Med. Science and Literature, Manchester, 1836.

In consequence of the undue importance attached to operations, the principles deduced from experience, by the highest authorities in the profession, as to the propriety or impropriety of operating in particular cases, are either misunderstood, or are disregarded for the vanity of a display in flourishing the mutilating knife upon a fellow creature, even in desperate or hopeless cases. In some such cases the chief argument I have heard used for operating was, "to give the patient a chance," as if the shock from the amputation of a limb was calculated to revive the expiring embers of life! In others, the ingenuity of the surgeon seemed put upon the rack to create reasons "to justify the operation," which, if a measure really necessary to preserve life, required no other justification than that there are good grounds for expecting success.

But when a surgeon either resolves to perform a capital operation, which endangers the life of the patient, upon a chance of success, implying that success, though possible, by some fortuitous or miraculous escape that may occur, is very improbable; or finds himself under the necessity of ransacking his ingenuity to contrive arguments to justify his proceedings, he may well pause and inquire what is the rule of duty in such a case. Should he not inquire what are the principles of the profession, which reason and experience have established as applicable to such cases? what the duty of one man to another? whether or not he would sanction the operation if he was himself the patient, or if the case was that of his own child?

In cases of injury or disease capable of being cured only by a capital operation, before resorting to this measure, the following questions should always be satisfactorily answered; 1*st*, Is the operation necessary to save the life of the patient? 2*d*, Is there a fair prospect of success? Unless the case stands this simple test, the performance of the operation would be decidedly improper.

In proof of the correctness of these statements, by acting upon the principles here described, I have, during the last four years that I have been connected with the Infirmary, performed only 16 amputations of the extremities, 13 having been in the house and 3 in private. These operations were performed partly on account of severe injuries, and partly for diseases of the bones and joints. They consisted of amputations above the knee, 7; of the leg, 4; of shoulder joint, 2; of arm above elbow, 3; making altogether, 16. Of these, 15 recovered and only one died. But had these principles been deviated from, and had other cases of patients in a dying state been operated on, to give them " a chance," my success would have been very different.

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* Mr Lawrence of St Bartholomew's Hospital says, in his Lectures, to an extent of "one-half or two-thirds within the last twenty five years."

The greatest difficulty in the practice of medicine and surgery is not so much in the application of remedies, as in being able to distinguish the nature of the disease, and in deciding on what remedy is to be employed. To discriminate difficult cases with accuracy, and to form a correct and proper judgment, in many important surgical diseases, as to whether or not an operation should be resorted to, are the great difficulties and *desiderata.* The acquisition of the skill, tact, and knowledge necessary for this, is by far the most important and truly useful part of surgery. This is the qualification, for the attainment of which the most distinguished members of the profession have devoted twenty, thirty, or even forty years of their lives to arduous labours and zealous exertions in the great school of experience.

Having, in the course of my life, had occasion to see some operations performed which ought not to have been resorted to, and others neglected which ought to have been performed, where the lives of fellow-creatures were at stake, I have often directed my attention to the consideration of the principles by which our practice should be guided in such cases, conceiving this to be a subject of paramount importance. These principles are only to be ascertained by experience, in connection with the study of physiology and pathology.

The study of the great principles of surgery, although they form leading guides and landmarks for our direction in practice, seems to be very much neglected in the present day; and the attention of the student is distracted, and frittered away in trifling conceits connected with the more humble, the manual part of the profession; such as, the form of making an incision, or the kind of knot to be tied on the ligature of an artery. Or, his mind is engrossed and dazzled by the performance of a great operation, without attention to the circumstances on account of which it is performed, or to the reasons which, in similar cases, forbid its adoption. Conceiving these abuses and corruptions of the times, to have a baneful influence upon the junior members of the profession, I have considered it my duty, however imperfectly, to point them out and endeavour to correct them.

The above considerations have led me to contribute my mite of experience and observation, towards establishing and illustrating some of the more important principles of surgery. In carrying forward this my present object, I purpose to treat of several important subjects in succession, such as injuries of the head, injuries of the extremities, erysipelas, gangrene, diseases of the larynx, diseases of the joints, &c.

I.—OF INJURIES OF THE HEAD.

A.—Of Concussion of the Brain.

The three following cases of concussion of the brain, serve well to illustrate the effects of this state, as also the principles of treatment in such cases.

Case I.—George Waters, aged 27, a labourer, married, of temperate habits.—8th June 1838. About an hour before being this day brought into the Royal Infirmary, he fell from a height of twelve or fourteen feet, at a house where he was at work, and was taken up in a state of insensibility.

When admitted, he was in a state of insensibility to what was passing around or said to him, but not to pain. Breathing slow and somewhat laborious; surface cold; pulse 80; pupils contracted. Nearly opposite to the middle of the right parietal bone, there is a wound of the scalp about two inches long, but the pericranium and bone seem uninjured. The right clavicle is fractured.

Head shaved—warmth applied to extremities—a turpentine enema administered.

8 o'clock P. M. Two evacuations from bowels; pulse 80; is otherwise much the same as in the forenoon. Enema repeated. To have a purgative draught in the morning.

9th, He continued in the same state all night. He swallows, though with some difficulty; pulse 84; two stools passed in bed without his knowledge. Sixteen leeches were applied to the forehead, afterwards cloths wet with cold water to scalp; purgative to be repeated in the morning, consisting of senna draught with castor oil.

10th, Continues much in the same state as when admitted; leeches bled well; pulse 90; the surface was warm; the head felt hot; three stools were passed involuntarily. The leeches were repeated, and the cold applications to the head were continued; purgative to be repeated in the morning if necessary.

11th, Sensibility to objects around him increasing. Swallows more easily; pulse 80; skin warm; several stools.

12th, His sensibility is much improved; is said to have recognized his wife to-day for the first time since he received the injury; pulse 86. When spoken to with a loud voice, he appears to understand, and makes an attempt to put out his tongue when desired. Had three stools, which he persisted in voiding at the water closet.—Continue.

13th, Twelve leeches were again applied last night, on account of increased excitement; has passed a good night. He now looks up when loudly spoken to, and is able to put out his tongue; pulse 86; swallows better.—Continue.

14th, Has taken some breakfast to-day, and is becoming more sensible to objects around him; bowels open.

15th, Some pain of head; in other respects, he continues to recover. The application of cold to the head was continued, and the cathartic draught was repeated.

16th, No headach; the wound of head is healed. A bandage applied for the broken clavicle. Pulse 80; tongue clean and moist; bowels open.

23d, He has continued progressively to recover. Appetite good; bowels regular; has no recollection of any of the circumstances attending his fall, or of the treatment he has since undergone. His memory seems to have been completely suspended.

30th, Is quite well; strength recovering; clavicle well united; pulse 70; breathing regular. Dismissed cured.

In this case there was at first the usual state of prostration with collapse or depression of the system. Reaction afterwards took place very slowly, and was easily controlled; the insensibility went off very gradually. The memory was suspended; the hearing was much impaired, but these faculties afterwards recovered.

CASE II.—Alexander Carmichael, aged 27, a labourer—healthy, and of temperate habits.—10th August 1838. Was this day admitted into the Royal Infirmary at 10 o'clock P. M. in a state of insensibility. He was brought in by the police, who stated that he was found at the foot of a flight of steps in the College Wynd at 4 o'clock in the morning; but, having been then considered to be in a state of intoxication, he was carried to the Police-Office, where he remained till brought to the Infirmary.

He lies in a state of insensibility, by which he cannot be made to answer questions, but he can be roused by pinching. Respiration slow but natural; surface colder than natural; pulse 70, soft and regular. There is a wound of the scalp, nearly two inches long, upon the middle of the left parietal bone, but the pericranium and bone seem to be uninjured.—It was ordered that the feet should be bathed in hot water containing mustard, that the head should be shaved, and that an enema should be administered.

On the 11th, the surface was warmer than natural; the pulse 86 and firm; the pupils somewhat dilated. It was with difficulty that he could be roused from stupor; several stools were passed involuntarily; he swallowed liquid, but had taken no food.—Eighteen ounces of blood were directed to be taken from the arm; cold cloths were applied to the head; and he was ordered to take immediately five grains of calomel, and fifteen grains of the compound extract of colocynth.

12th, The blood drawn was slightly buffy; surface warm; pulse 90, soft. He is otherwise much as yesterday; swallows without difficulty; the pupils contracted by light; several stools passed involuntarily.—He was ordered to have immediately three grains of calomel, and to be repeated every third hour; and a blister was applied to the head.

13th, Considerable restoration of sensibility; the skin was warm; the pulse 100, soft; several involuntary discharges from bowels; blister has risen; wound of scalp looks well. He endeavours to answer questions when very loudly spoken to; articulation very indistinct; pupils natural; tongue moist.—Twelve leeches were applied to the head, and the calomel was continued.

14th, Some improvement; pulse 100, soft; several stools passed involuntarily.—The calomel was continued every fourth hour.

15th, Continues to improve slowly; countenance looks more natural; answers questions incoherently; swallows easily; stools still passed involuntarily; pulse 90, soft; tongue moist.

17th, He continued improving; the stools passed with consciousness; the pulse was 86, soft; deafness continued, and articulation was indistinct.—The calomel was stopped.

19th, He continued to recover; questions answered rationally; made no complaint.

21st, He complains only of hunger; pulse 74; deafness and loss of memory continue.

28th, Deafness better; loss of memory continues; in other respects is improving daily, and is now out of bed.

September 1. Dismissed cured.

In this case, the primary collapse was followed by considerable reaction and cerebral excitement, which required more active treatment than the preceding case.

Case III.—William Grant, aged 40.—25th January 1839. Fell down a flight of steps on the 23d instant, by which he received a blow on the back part of his head, and afterwards fell on his back, and received an injury near the sacrum. He was taken up in a state of insensibility, and continued so till his admission to the Infirmary.

He lies always as if asleep; breathing natural; pulse 65, soft, and rather feeble. When eyes are opened, there is intolerance of light; pupils natural; dislikes to be disturbed, but can be roused when loudly spoken to. When asked questions, he occasionally answers in an indistinct, confused, and laconic manner, after which he again sleeps.—To have a purgative, and warmth applied to the feet.

26th, Is rather better; pulse 70; is very unwilling to be disturbed; aversion to the light continues; has considerable thirst; takes nothing but drink; medicine has operated well.—Head to be shaved and cold applied to it; feet to be kept warm.

27th, Head cool; complains much without being able to say what distresses him; dislikes being disturbed; speaks more distinctly. Is still averse to light, and seems very sensitive as to cold when the bed-clothes are taken off any part of him. Pulse 60, soft and feeble; skin cool; countenance looks collapsed; has retention of urine.—Cold cloths to be removed from head.

Half an ounce of port wine with water was ordered to be given every hour; the catheter to be introduced; and he was to have two compound colocynth pills.

28th, Is greatly better; answers questions distinctly. Only a few doses of the wine given, when he seemed to become so much better that it was discontinued. Looks up, and has no inconvenience from the light; urine voided naturally; bowels open; pulse 80; sleepy state has gone off; has no recollection of the day on which he fell, or how he was hurt.

29th, Answers questions incoherently; pulse 70, small and feeble; bowels open; catheter required.—He was ordered to have every hour one ounce of wine if requisite; and a blister was directed to be applied to the head.

30th, Complains much of the pain of the blister; seems restless and impatient; pulse 68, feeble.—The wine was continued.

31st, Continues to improve; bowels open; sleeps well; is quite rational; pulse natural.—The wine was continued.

1st February, Complains of soreness of scalp; is otherwise as before; tongue foul.—He was ordered immediately three grains of calomel, and to be repeated in the evening.

2d, Is still unwilling to be disturbed; lies much as if asleep. When roused, he answers questions in a peevish manner. Complains of soreness of blistered surface; pulse 70, of pretty good strength; heat of surface natural; sensibility to cold continues; several bilious stools.—Continue.

4th, He still lies nearly in the same state; bowels open; pulse 80; is somewhat improved.

7th, Continues to recover. Intellectual faculties are improving.

14th, Dismissed cured.

In this case, the intellectual faculties were, as in the preceding cases, much impaired and disordered. The state of primary collapse continued for several days; and the tendency to an increase of this, in place of reaction, formed the most prominent feature of the case. Upon stimulants being given the patient recovered.

From this and other cases, it has appeared to me to be a much more favourable circumstance in concussions of the brain, when reaction takes place slowly and gradually, than when it takes place quickly and with too great violence. Consequently, that reaction should not be too much urged and hurried by the administration of stimulants.

Remarks on Concussion of the Brain.—In each of the above cases the usually described symptoms attending uncomplicated concussion of the brain were well marked. The disorder of the intellectual faculties and diminished nervous energy, followed by reaction, were very obvious, having occurred in a very remarkable degree.

Several circumstances render it highly probable, that severe concussions of the brain produce organic lesion of this important organ. These are, the disordered and diminished functions of the brain, as indicated by the suspension of the intellectual faculties, the sinking and depressed state, or even complete annihilation of the vital power of the nervous system,—the uniform occurrence of reaction, and the great tendency to inflammation following the injury, when it has not been too great,—and the lacerations of the brain seen on dissection, in cases which terminate fatally from other causes.

In very severe cases of concussion, such violent changes are produced in the organization of the brain, that the organic combinations of matters necessary to life cannot be maintained. When the concussion has been less violent, the organic processes are so much disturbed that the functions are disordered. This is followed by the increased action set up by the natural curative power possessed by living organized bodies, for the purpose of restoring the healthy state, by counterbalancing chemical affinities and the tendency to decomposition. The increased action thus excited produces the inflammation which generally supervenes and often proceeds to a fatal termination.

That the disorder or lesion produced by concussion is chiefly situated in the hemispheres of the cerebrum, seems highly probable, from the state of the patients almost completely resembling that of animals from whose heads these hemispheres have been removed. According to the experiments of physiologists, (see Müller,) animals in this state could be kept alive for a great length of time; they lost their intellectual faculties, as also their sight and hearing; but they retained muscular irritability, and those functions which are, in a great measure, independent of the hemispheres of the cerebrum. Hence they swallowed food, and the animal functions were carried on, but they seemed as if always asleep and disliked to be disturbed. These functions, though (for their perfect state) dependent on the integrity of the whole nervous system, are carried on chiefly by the influence of the *medulla oblongata*, the spinal cord, and sympathetic nerve; while the disturbed and diminished power of the cerebrum tends to lessen, and, in some cases, to annihilate their power.

The cases above detailed, and the explanation given as to the nature of the affection of the brain produced by concussion, show the principles upon which the treatment of this injury should be conducted. They point out different and entirely opposite states which often occur in the progress of the cases. These not only require a different kind of treatment, but that it must be applied with great caution and discrimination. On the one hand, the sinking of the vital power or state of collapse which ensues, is apt to continue and produce death; on the other, inflammation is apt to follow reaction occasioned by the injury, and proceed to a fatal termination. These results are, therefore, constantly to be kept in view, and counteracted as much as possible by the application of appropriate treatment. It is also to be observed, that cases of concussion of the brain do not bear active treatment of any kind well, reaction being very easily increased by stimulants, and depression easily produced by cold applications to the head, and depletion. This arises from the greatly diminished nervous or vital energy which accompanies the other effects of the injury. Hence, cases of concussion require the most constant and attentive watching as they proceed, in order to observe the changes which take place in their symptoms, so that the proper treatment may be adopted.

In many cases, when the primary or immediate collapse is considerable, the reaction requires to be excited and promoted by the use of stimuli, which act on the nervous system; such as the application of external warmth, and the administration of wine or diluted spirits, ammonia, camphor, &c. By these, the weakened and sinking animal functions are kept up,—life is preserved,—reaction takes place,—the vital power is recruited by the other vital stimuli, (food and drink,)—and the lesion of the brain becomes cured. The next indication is to obviate and lessen excessive reaction, and the inflammation which follows it, by cold applications to the head, blood-letting, and other evacuations. In employing these remedies, the surest guides are the frequency and strength of the pulse, the pain in the head, and other symptoms of fever. In concussion of the brain, depletion is only to be carried to a moderate extent, on account of the degree of prostration or diminished power, which accompanies the reaction and excitement. General or local blood-letting is to be repeated according to circumstances; purgatives, particularly those usually combined with calomel, are to be administered; diaphoretics are also to be given in conjunction with warmth, or warm bathing to the feet.

In each of the states of collapse and excessive reaction, blisters to the scalp are highly beneficial; in the one case, by acting as a stimulant, in the other, as a counter-irritant.

The above cases also point out the injury which would result from an opposite course of treatment; such as depletion in the state of collapse, by those who employ the indiscriminate use of blood-letting in all injuries of the head, regardless of the particular stage of the case or state of the patient, on the one hand,—or the use of stimulants where reaction and cerebral excitement has taken place on the other. In the first, the already diminished powers of life would be further lessened and exhausted; in the second, the reaction would be augmented to inflammation, with its too often fatal consequences.

In criminal trials for the infliction of injuries upon the head, in which the injured individual is able to be a witness, it is obvious, from the disordered state of the intellectual faculties, and particularly of the memory, arising from concussions, that his evidence should be taken with extreme caution, in regard to circumstances which happened at the time of the injury; and, indeed, it should only be received in so far as it is corroborated by other testimony.

B.—Of Concussion of the Brain attended with effusion of blood within the Cranium.

In many cases of severe concussion of the brain, there are symptoms of compression of this organ, produced by blood effused in considerable quantity within the cavity of the cranium, either from a laceration in the substance of the brain, or of some of the vessels upon its membranes.

The following cases afford illustrations of this state. It is generally accompanied with fracture of the cranium; and the effusion of blood may take place either immediately upon receipt of the injury, or after the lapse of some time when reaction has commenced. In the latter case the immediate effusion is suspended, probably by the diminished force of the circulation which occurs before reaction is established.

Case IV. Janet Leechman, aged 27, May 17th 1838, was brought into the hospital this morning at five o'clock, in a state of complete insensibility. She had been found, it was said, at the foot of a steep flight of steps. Two women who accompanied her said she had been in a state of intoxication for the last three or four days, and was so last night. Soon after she was found, she was seen by a surgeon who attempted to apply the stomach pump, but without success.

When admitted she was in a state of perfect coma, with laborious breathing, cold extremities, and the pulse not perceptible at the wrist. There is a small lacerated wound upon the scalp at the posterior part of the right parietal bone, but no fracture is perceptible. Pupils dilated, and not affected by strong light. There is some blood issuing from right ear.

Several pounds of fluid smelling strongly of spirits were evacuated from the stomach by the pump. A stimulant enema was administered, the head shaved, and warmth applied to the extremities.

12 noon. Surface warm; pulse 100 and soft; breathing is less laborious. She lies in a state of stupor from which she can be roused. Two stools. Cloths wet with cold water applied to head. Enema repeated.

18th. Is much as yesterday; pulse 86 and soft; has taken some tea; bowels freely opened; discharges passed in bed; pupils still dilated; surface warm; complains of pain when the wound is examined, and the light seems to be offensive when the eyelids are opened.

19th. Symptoms as above, but the insensibility has increased. Pulse 76, soft; swallows with difficulty; respiration laborious and slow. The same treatment continued. Blisters applied.

20th. She continued to become more insensible and comatose, accompanied with laborious breathing, and less frequent pulse, till this morning at half-past six, when she died.

Dissection.—Bones of cranium of unusual thickness. A fracture was found to extend from the seat of the wound on the right side of the head, downwards through the petrous portion of the temporal bone. The fractured surfaces of the temporal bone were separated from each other to the distance of about the twelfth part of an inch. A small portion of the brain at this part was lacerated, disorganized, and mixed with coagulated blood.

On the left side of the head a large portion of coagulated blood was situated under the dura mater. This effusion of blood had taken place between the membranes upon the surface of the middle lobe of the left hemisphere of the cerebrum; and beneath it the substance of the brain was to a considerable extent disorganized and mixed with small masses of grumous blood.

In this case, the patient, when brought into the hospital, seemed labouring under the effects of excessive intoxication and concussion of the brain. By the evacuation of the stomach, &c. the effects of the spirits went off, but those of concussion continued. The patient could be roused, became somewhat sensible, and was able to swallow what was given to her. But on the third day she became more insensible, and then comatose, with laborious breathing and failure of the pulse,—indicating by this apoplectic state that effusion of blood had taken place into the cavity of the cranium, and was producing compression of the brain. It is to be particularly observed, that the chief effusion of blood was situated on the side opposite to the external injury, beneath the dura mater, and also that lacerations of the brain had taken place at several parts to a considerable extent.

CASE V. Jean Hastie, aged 24, January 18th 1839, was brought into the hospital about two o'clock this morning by the police, who stated that they had picked her up at the foot of a stair in Rose Street, a short time previously. When admitted she was in a state of insensibility, and only showed signs of life when pinched. The pulse could not be felt at the wrist, and the extremities were cold and rigid.

On examination two lacerated wounds were found upon the scalp, one about an inch in length situated over the middle of the frontal bone, the other about three inches in length at the posterior part of the occipital bone. Both of these wounds were situated on the right side of the mesial line. Neither fracture of the skull could be felt nor injury of the pericranium. Warmth was applied to the feet and arms.

At 9 A. M. The heat of the body improved, the pulse became perceptible at the wrist. At first it was of pretty good strength, but afterwards it became weak and intermittent. The breathing became stertorous about an hour previously, which continues.

Noon. She lies in a complete state of apoplexy. At a consultation held with several of my colleagues, no operation was considered expedient.

19th. The patient continued to sink till six o'clock last night, when she expired.

Dissection.—On removing the scalp from the cranium, considerable ecchymosis was found at the situation of each of the wounds. This extended from the posterior wound forwards to the right ear. Beneath the *dura mater*, a large clot of blood was found on the anterior part of the left hemisphere of the brain, accompanied with laceration of its substance to a considerable extent. When the brain was removed, a large quantity of effused blood was found at the base of the cranium, within the dura mater. There was a fracture at the base of the skull, extending from the situation of the wound over the occipital bone to the *foramen magnum.* There was also some effused blood at the base of the cranium exterior to the dura mater.

This was a case of violent concussion of the brain, producing great laceration of its substance, and effusion of blood. The compression of the brain caused by this blood produced the symptoms of apoplexy which existed. The extensive laceration of the brain, and the compression, more especially, of the *medulla oblongata*, caused speedy death. Although the wounds might have been expected to point out the situation of the effused blood, it was found chiefly at other parts, and within the cavity formed by the dura mater.

Case VI.—James Latta, aged 30 of intemperate habits.—27th September 1837.—Was brought into the hospital in a state of insensibility, and having a lacerated wound on the back part of the scalp. He was reported to have been drinking spirituous liquors to excess for two days previously. No apparent injury of bones of cranium.—Warmth applied to feet, &c.

28th, Passed a quiet night; is at present sensible; complains of great pain referred to the frontal region; pulse 80, soft; tongue furred; has tremors of tongue when protruded, also of hands and feet.—Was bled to fourteen ounces; had a purgative, and an antimonial diaphoretic mixture.

29th, Bleeding produced faintness; was affected with muttering delirium during the night; makes no complaint of pain of head; wound looks well; two stools; pulse 80, and soft.—Diaphoretic mixture continued.

30th, Had slight delirium during the night; pulse 88; tongue furred.—To have two grains of calomel and three grains of antimonial powder three times in the day.

6th October, His pulse rose, and the delirium became more violent.—Opium and spirits were administered in considerable quantity, with apparent advantage, in producing a more tranquil state.

7th, Incoherent muttering continues; pulse 120; had a bad night: wound is discharging freely; there is paralysis of the left upper eyelid.—Small doses of calomel and antimonial powder were ordered; milk diet, &c.

8th, Symptoms much the same.—Twelve ounces of blood taken from back of neck by cupping. Calomel and antimonial powder repeated.

11th, A blister applied to head rose well. He can raise the palsied eyelid better; pulse 80, and soft; seems very feeble, and continues muttering; bowels open; tongue furred; tremors general.—A small quantity of spirits and water were ordered to be given every second hour.

17th, Has continued much in the same state.—He has been treated with spirits, opium, purgatives, and blisters, as also beef-tea. Passed a tolerable night, but there is an erysipelatous flush on right side of head. The quantity of spirits given was diminished; a jalap purgative administered, &c.

24th, The symptoms of *delirium tremens*, erysipelas, and of other effects of the injury, continued without much variation; the face and neck became much swollen; the pulse varied from 100 to 120, and was very weak. The discharges passed involuntarily in bed. He became gradually weaker till this morning, when he died.

Dissection.—Between the scalp and temporal bone, as also at.

other parts which had been affected with erysipelas, there were collections of purulent matter.

At the situation of the wound upon the scalp, there was a stellated fracture of the posterior part of the left parietal bone, without any irregularity of surface by which it could have been detected during life. The fracture extended to the petrous portion of the left temporal bone, and the *dura mater*, in the situation of its course, was in a softened and inflamed state, there being lymph effused on its surface. A cavity, accompanied with softening, was found in the substance of the right anterior lobe of the cerebrum, containing the remains of a coagulum of blood. This cavity appeared to have existed for a considerable length of time, as the blood was for the most part absorbed. There was a considerable effusion of blood at the base of the cranium, and a fracture through the middle of the right orbitar place.

In this case, the patient had suffered a severe contusion upon the head, producing concussion of the brain, accompanied with fracture of the skull at its base, lesion of the brain, and effusion of blood into the substance of the brain, as also into the base of the cranial cavity. These were followed by inflammation of the *dura mater*, delirium tremens, and erysipelas; yet, notwithstanding all this complication of injury and disease, he lived for four weeks. At one time he appeared to be recovering, and, had his constitution been in a more favourable state, he certainly would have had a much better chance of getting well.

Case VII.—Alexander Tait, aged 33, on the 23d December 1836, fell from his seat when driving the Railway omnibus at the head of the North Bridge, by which he received a contusion on the left temple, about six o'clock P. M. The fall stunned him, and rendered him insensible. He was carried to the coach-yard at St Leonards, where he recovered so far that he was able to converse with his wife, who had been sent for to see him. After a short time he again became insensible, and, about eight o'clock, he was conveyed to the Royal Infirmary, where he arrived in a state of complete insensibility and coma. When I saw him, before ten o'clock, he was completely comatose, from which state he could not be roused. His breathing was stertorous; his pupils dilated; his pulse 80, and intermitting; and there was a tendency to coldness of the surface of the body.

The only mark of injury upon his body was a slight mark of contusion, attended with some ecchymosis, upon his left temple; no fracture of the skull could be felt, and there was no external wound.

From the symptoms and history of the case, I conceived that an effusion of blood had taken place upon some part of the brain, and that he would not live many hours. He died about four o'clock in the morning, having lived ten hours after receiving the injury.

Dissection.—Ecchymosis of the scalp was found at the upper part of the left temple, a fracture of the cranium through the temporal bone, and extending across the base of the skull. There was a large circumscribed clot of blood between the skull and *dura mater*, about four or five inches in diameter, and one inch in thickness, beneath the fracture of the temporal bone. This was found to have taken place from a rupture of the meningeal artery. There was a laceration of a portion of the brain, at the posterior part of the optic thalami, in which there was some extravasated blood. The internal ear was filled with coagulated blood.

In this case, the nature of the injury, and the interval of sensibility which occurred after the first stunning from concussion by the fall, followed by the symptoms of compressed brain, pointed out, with great accuracy, the existence of effusion. An important question then arose: Could the effused blood not be evacuated? In this case it was impossible to say where the extravasation of blood was situated. There was a slight mark of contusion upon the left temple. But though the injury had been received upon this part, the effusion of blood was as likely to have been situated on the opposite side of the head as upon this; so that an opening through the skull could only have been made experimentally. But it was obvious afterwards, that the injury done to the interior of the brain would most probably have prevented the recovery of the individual, even if the blood had been evacuated from the surface of the brain.

In this case I explained, as my opinion, the great probability of an effusion of blood upon the brain, at the situation of the mark of external injury, and proposed to one of my colleagues, who was present, to make a perforation through the skull; but as he disaproved of it, I did not think it proper to proceed.

Case VIII.—Mr G. W. aged 48, April 19, 1839, was, about three o'clock this afternoon, thrown with violence from his gig, by the horse becoming unmanageable, and fell on the pavement with great force upon his head. The accident having happened close to the Royal Infirmary, Mr W. was immediately carried to a private room in the house.

When I saw him about four o'clock, Mr W. was almost insensible,—not being able to speak. He could open his eyes, move his head and extremities, and seemed to recognize some of his friends who were about him. He appeared, at times, to know what was said to him; he frequently put his hands to his head, and seemed anxious to speak, but could not.

Above the left ear there was a mark of contusion, consisting of an ecchymosed swelling, upon which pressure caused great pain. Blood flowed pretty freely for some time from the left ear. No fracture of the cranium could be felt. There was no other mark of injury present, except an abrasion of the cuticle at the top of the right side of the head. The heat of the body, the pulse, and the breathing, were natural. It was reported, however, by those in attendance, that he was gradually becoming more insensible than he had been when they first saw him after the injury.

In consultation with Dr Lewins, and my colleague, Mr Fergusson, who had both seen Mr W. before my arrival at the Hospital, it was considered highly probable that a fracture existed at the base of the cranium, and that effusion of blood was taking place into its cavity. With a view to lessen or arrest this effusion, and as there were no symptoms of collapse present, we agreed that blood should be taken from the arm. He was accordingly bled to eighteen ounces; cold cloths applied to the head, and warmth to the feet. Mr W. seemed very averse to being bled, but could not express what he wished. He distinctly expressed surprise at, and ignorance of the reason of, his present situation. After the bleeding he vomited and became restless, but did not seem benefited.

When I visited Mr W. at a quarter before eight o'clock P. M. his two friends, Dr Lewins and Mr Brown, were in attendance. Mr W. had become completely insensible about seven o'clock, before which he was at one time very desirous to get out of bed, and was with difficulty forced to remain quiet.

When I saw him he was in a complete state of apoplexy, from which he could not be roused; pulse 60; breathing at times stertorous; pupil of right eye contracted, that of left dilated more than natural.

Mr W. was becoming so rapidly worse, and being apparently in a sinking state, I did not think there was time for calling a formal consultation of the whole surgeons of the hospital; but I sent for Mr Fergusson, who had previously seen him. In consultation with these gentlemen, I proposed making an opening through the cranium with a trephine above the left ear, where I considered it very probable there was blood effused, making pressure upon the brain. But in this proposition I was not supported. Mr Fergusson thought it probable there was fracture at the base of the skull accompanied with effusion, which being the case, he saw no good grounds for operating. Mr Brown did not think that the prospect of advantage was such as to render an operation advisable.

I stated, that the case appeared to me quite hopeless, unless the patient was relieved by an operation; that the case was in many respects similar to one (Alexander Tait, Case VII.) in which I regretted not having operated; that an operation could not render the situation of the patient worse, and might prove beneficial; but, being an operation somewhat experimental, I would not perform it, as it had not their sanction.

It was afterwards agreed that more blood should be taken from the head by cupping, and purgative injections administered, which were severally done, but without any amendment of the symptoms.

20th, He continued in the same state; became gradually weaker, and died at eight o'clock this morning.

Dissection.—Before the body was removed, permission was granted to open the head. Extensive ecchymosis of the scalp was found above and behind the left ear, extending to the occiput. When the upper part of the cranium was severed by the saw, the *dura mater* was found to adhere so firmly, that it came off along with it. Between the skull and the *dura mater*, there was a large coagulum of blood, situated on the inner surface of the temporal, and posterior and inferior part of the parietal bones. This coagulum formed a cake, which was nearly circular, as it measured 4 inches from before backwards, and 3½ inches from below upwards. At the centre it was nearly an inch in thickness, which gradually decreased towards the circumference. This effusion of blood had separated the *dura mater* from the skull to the extent now specified; and it seemed to have proceeded from several small vessels, but chiefly from the posterior meningeal artery having been ruptured.

A fissure or simple fracture of the skull was found to have taken place, from the left side of the occipital bone, and to have proceeded forwards through the petrous portion of the temporal bone to the *foramen ovale* of the sphenoid, where it terminated; but a branch of it was sent up, from the petrous portion, through the squamous portion of the temporal bone. This temporal branch of the fracture crossed the course of the posterior meningeal artery, which was probably the cause of its rupture. See Plate I.

There was no displacement of the bones at any part of the fracture, but a small fragment was detached from the upper part of the petrous portion of the temporal bone, which forms the internal ear, and hence the flow of blood from that organ.

A small portion of the substance of the brain was broken down, and mixed with small coagula of blood, both at the lower part of the anterior lobe of the right hemisphere, and at the most prominent lateral part of the middle lobe of the left hemisphere.

The above presents a case which is highly interesting, from the several important practical points it serves to illustrate. The immediate stunning from concussion soon went off; sensibility to a certain extent returned, but was again extinguished, by the compression of the brain from effused blood. As in the preceding case of Tait, the progress of the symptoms pointed out this, in a remarkable manner, to be the nature of the injury. The lucid interval (if I may so express it) which occurred soon after the injury, preceding the well-marked symptoms of complete apoplexy, without any depressed fracture of the cranium, distinctly indicated that compression of the brain had gradually taken place, which could only have been occasioned by effusion of blood within the bony cavity.

In cases of this nature, an important question then presents itself to the surgeon, viz. Where is the effusion of blood situated? and if on the external surface of the brain, is the evacuation of the blood within the reach of his art?

To ascertain the situation of blood effused within the cavity of the cranium with precision, is a problem beset with many difficulties. There are three situations in which it may occur, namely, between the skull and the *dura mater*, between the *dura mater* and surface of the brain, or into the interior of the brain. But the effusion does not always take place at the situation of an external injury, as is remarkable in Cases 4, 5, and 6. On the contrary, it often takes place in the opposite side of the cranium, and yet the symptoms are precisely similar.

It is of importance to observe, however, that when the effusion is at the base of the cranium, compressing the *medulla oblongata*, death is generally immediate; whereas, if the blood is situated at any of the sides or upper part of the cranium, the patient, though he becomes apoplectic, may live for a considerable number of hours or even days.

Another circumstance worthy of remark, is that relating to the opinion stated by the late Mr Abernethy and Sir B. Brodie, that blood is never poured out in such quantity between the bone and *dura mater* as to produce dangerous pressure upon the brain, " except where the middle meningeal artery has been lacerated."* Sir B. Brodie further states, that he had not seen a case of laceration of this vessel, without a fracture running across its bony canal. But he adds, that some cases of this artery being opened without fracture of the bone have been recorded by others.

Here, then, we have evidence, at least, of the frequent occurrence of rupture of the meningeal artery, when the bone, along which it is situated, is fractured.

In cases, therefore, accompanied with symptoms of compression of the brain from effusion of blood within the cranium, when death does not take place suddenly, when there is an injury in the temporo-parietal region, but more especially when there is a fracture of the skull in this situation, and bleeding from the ear, the *probability* of this being the seat of the effused blood amounts almost to *certainty*.

Upon these grounds, I formed the opinion I entertained, as to the situation of the effusion of blood, in the two preceding cases, and in both of them with perfect accuracy.

Regarding an operation to evacuate the effused blood by a perforation through the cranium, it may be remarked, that it is an operation which is not of its itself dangerous, and that, though sometimes performed without giving exit to the blood, in other cases it has been followed with the most triumphant success.

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* Medico-Chirurgical Transactions, v.—xiv.

When a patient is dying in a state of insensibility, this operation can neither aggravate his sufferings, nor increase his danger, and, if the cases be properly selected, may at least in some of them be followed with success.

If, therefore, some of our predecessors performed this operation too frequently, there is perhaps an error of an opposite nature in the present day. From its *abuse* the operation has fallen into *disuse*. But the cases in which the patients have been saved by this operation, together with the indications of blood, most probably existing in a situation from which it could be evacuated, sufficiently show that this operation may occasionally be resorted to with propriety and success.

When, therefore, symptoms of compressed brain from extravasation of blood occur, the case being very hopeless without an exit for the effusion being obtained, if the seat of the injury is indicated by an external mark of contusion or wound, the surgeon ought to proceed to remove a portion of the cranium by means of the trephine. This is proper, from the probability of success, as proved by previous experience, the operation not making the situation of the patient worse, and it being the duty of the surgeon to allow nothing to be left undone which might have afforded relief to the patient.

In cases of this kind, when there is only an external mark of contusion, upon an incision being made down to the bone, a fracture will sometimes be detected, which is a further indication of the seat of the extravasated blood. When the dura mater has been separated from the inner surface of the cranium, Mr Abernethy has remarked also, that the outer surface of the bone does not bleed so freely as it would do in the natural state.

This rule of practice will be found to be fully borne out by the opinion of the late Mr Pott, (on Fractures, p. 239;) the late Mr B. Bell, (System of Surgery, Vol. iii. p. 339;) the late Mr Abernethy, (Surgical Observations, Vol ii. p. 44;) the late Mr John Bell, (Lectures on Surgery, Vol. ii. p. 338, and 376;) Sir A. Cooper, (Lectures by Lee, Vol. i. p. 162;) and Sir B. Brodie, (Med.-Chir. Trans., Vol. xiv. p. 385.)

Explanation of Plate I.

Fig. 1. Base of cranium with dura mater removed; *a*, *a*, meningeal artery; *b*, *b*, the fracture.

Fig. 2. Scull-cap removed with dura mater adhering to it. *a*, the skull; *b*, *b*, the dura mater, between which a part of the clot is situated.

Surg. Jour. Mr. WATSON'S CASE. Plate I, p. 118, Vol. LI.

Fig. 1.

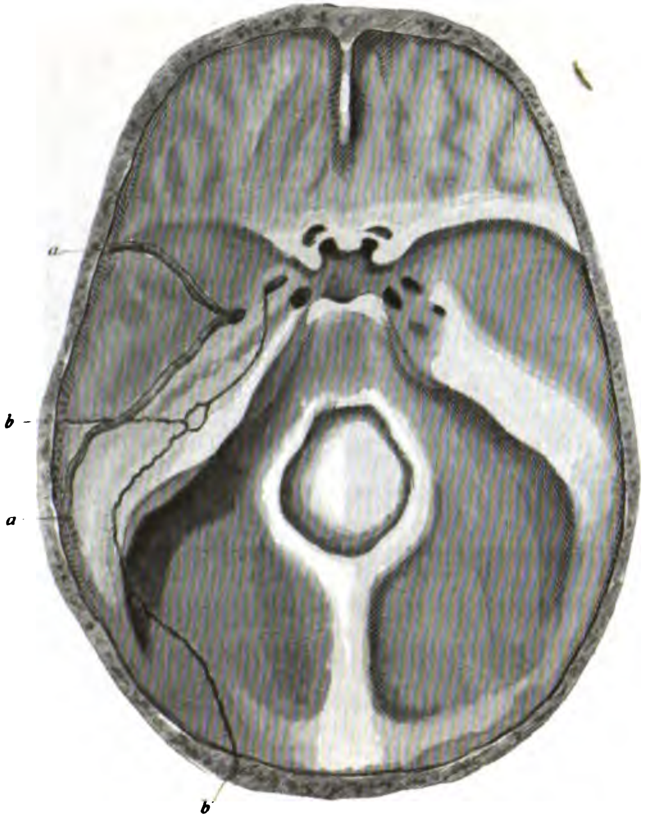
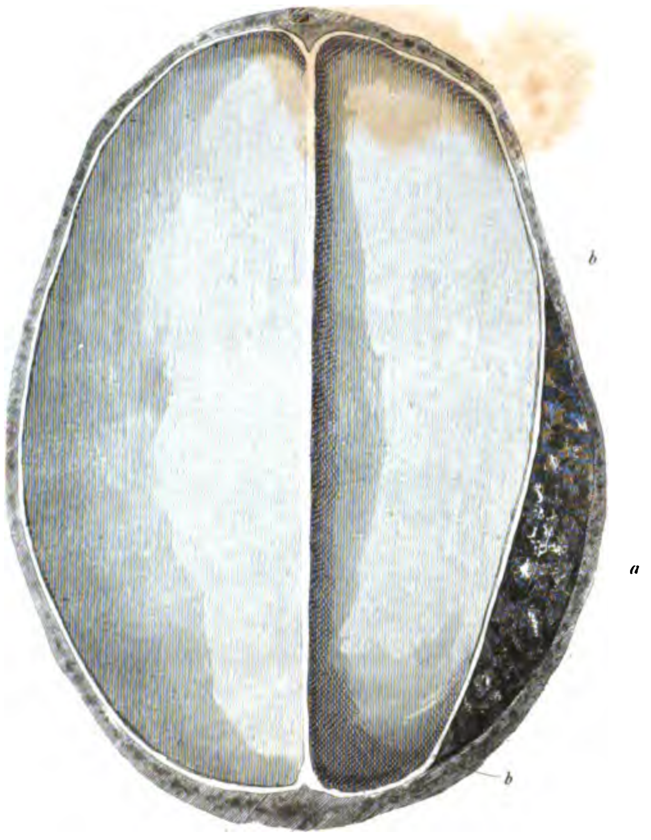


Fig. 2.



G. Aikman. Sc.

ART. VII.—*Contributions to the History of the Structure of the Human Ovum and Embryo before the third week after Conception, with a Description of some early Ova.* By ALLEN THOMSON, M. D., F. R. C. S. E., and Lecturer on Anatomy and Physiology. PART I.

THE anatomy of the human ovum, comprehending the fœtus and the membranes in which it is inclosed, has been studied with great care and success in its various stages subsequently to the third month of pregnancy, both by anatomists and by practitioners of midwifery; but it is generally acknowledged that its minute structure in the first stages of its formation, or in the first three or four weeks after conception, is very imperfectly known.

The main obstacles to obtaining this knowledge are, *first*, the difficulty of procuring specimens for examination, in consequence of the comparative rarity of abortion in the first three or four weeks of pregnancy; and *second*, the frequent unnatural condition of the ovum in cases of abortion. The striking analogy that has been ascertained to exist in the general phenomena of development of the ovum in very different classes of animals has, from the great success which has recently attended the investigation of this subject, prevented our feeling the want of knowledge of the structure of the human ovum from direct observation, so much as might otherwise have been the case; for the analogy demonstrated to exist in the greater number of the more important phenomena, has entitled us to extend its application to the whole history, of development.

Great, however, as the similarity in the general laws of fœtal formation may appear to those intimately acquainted with the subject, there are some persons who doubt the justness of the application to the human species of the general laws of development established by the observation of animals solely; and others who regard (though erroneously) the development of the human ovum as differing widely from that of the lower animals. There are, it must be allowed, several important particulars in respect of which the development of Mammalia differs from that of birds, and the development of the human species from that of both. On these grounds, if on no other, all will probably agree that, in matters in which such minute and accurate observation is required, it is highly desirable to multiply as much as is possible the number of careful descriptions of the contents of the human gravid uterus, and of the products of abortion, in the early stages of pregnancy.

It is in the hope of supplying one or two of the deficient links in our present knowledge of the condition and structure of the human ovum in the first stages of its formation, that I am induced to offer the following account of some ova which I have had an opportunity of examining with attention.

I shall premise the history of my own observations by a short record of instances of early human ova which have been described by others, so far as they have come under my notice.

All those who have paid attention to the subject now under consideration are aware that it is extremely difficult, if not indeed quite impossible, to determine exactly the period, after conception, at which, the human ovum arrives in the cavity of the uterus. Making full allowance for the usual loose manner of calculating the date of pregnancy in most instances of abortion, and the difficulties generally opposed to our obtaining a knowledge of the time of conception in instances of sudden death, there is every reason to believe that in the human species, as is well known to occur in several kinds of animals, there is considerable variety as to the time of the descent of the ovum, and also as to the rapidity of its evolution after its first arrival in the cavity of the uterus.

It appears doubtful whether the ovum of the human species has ever been distinctly observed in the uterus before the tenth or twelfth day after impregnation. There are several instances on record, it is true, in which the uterus of the human female has been carefully examined within eight days after the occurrence of conception; but it does not appear that the ovum has been seen *distinctly* in any of these cases.

Professor Baer gives an account* of the examination which he made of the pregnant uterus of a female who committed suicide eight days after impregnation. The principal signs of recent conception were present in this instance: a *corpus luteum*, in its first stage, was observed in the ovary, and the substance of the decidua effused on the inner surface of the uterus, had begun to be permeated by blood-vessels passing into it from the mucous membrane of the uterus; but no ovum was perceptible in the uterus, though sought for with great care.

Edward Weber published in 1830 † the history of the examination which he had made of the uterus of a woman 22 years of age, who committed suicide on the seventh day after she had been visited by her lover. All the marks of recent conception were present. The uterus, tubes, ovaries, and round ligaments were all turgid with blood; the size of the uterus and ovaries was increased; one of the Graafian vesicles was burst, and another was enlarged, prominent and vascular; and a layer of a substance like organizable lymph covered and intervened between the enlarged villi of the internal membrane of the uterus, which was probably the commencing decidua. I have not had an opportunity of seeing the original dissertation referred to in the note below, but only extracts from it in H. E. Weber's edition of Hildenbrandt's Anatomy,* and in the Saltzburg Medizinische Chirurgische Zeitung.† The statements made with regard to the presence of an ovum in the uterus in this case differ in the two extracts to which I have just referred; for in the first H. E. Weber makes no mention of an ovum, and says, " It appears doubtful whether here an ovarian vesicle had recently discharged itself, or whether it was only in the act of doing so;" while in the Saltzburg Journal it is stated, that, " in the middle of the posterior internal surface of the uterus, at a place where the membrane and decidua were redder than in other places, there was observed a small round transparent body, smooth on its free side, but at its margins united with the surrounding villi, and of a mother of pearl colour. In the middle of this there appeared a round, yellowish, and transparent point which had the appearance of a smaller vesicle inclosed in the larger. The smaller vesicle lay near the surface of the larger, so as even to press it out; at which projection there was also a small dark spot, such as Baer has represented in the ovum of the dog." The external vesicle the author considers as the ovum, and the lesser as the umbilical vesicle.

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* Siebold's Journal fur Gebürtshülfe, Vol. xiv. Heft. 3. Leipz. 1835, also in British and Foreign Medical Review, No. i. Jan. 1836, p. 238. This case is also referred to in the second volume of Baer's Vorlesungen über Entwickelungsgeschichte der Thiere. 1837. 4to.

† Disquisitio Anatomica Uteri et Ovariorum puellæ septimo a conceptione die defunctæ instituta. Halis, 1830.

Baer, in referring to this case, ‡ states, that there existed a doubt as to the presence of an ovum.

Sir Everard Home and Mr Bauer § believed that they had discovered a minute ovum and embryo in the uterus of a girl, who died on the seventh day, as was supposed, after impregnation. The case now alluded to has been so often quoted and discussed, that it is unnecessary for me to enter into its details. I shall only remark, that the examination of the uterus, which appears to have presented the principal signs of conception having occurred, was undertaken at a time when this subject was less understood than at the present day, and does not appear to have been conducted with that minute accuracy which the delicacy of such an investigation demanded.|| Admitting that impregnation had occurred at the time supposed, there are several circumstances which seem to show, that the small body described by Mr Bauer was not a fœtus, as he conceived it to be. Its lying near the neck of the uterus, its position within the cavity of the decidua, and not, as more probably ought to have been the case, imbedded in that substance, and the form of the body itself, which was described as

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* Vol. iv. p. 466, in a note.

† For 1832, Vol. iii. p. 10.

‡ Vorles. üb. Entwick. Vol. ii. p. 270.

§ Philos. Transact. 1817, p. 252.

|| Professor Baer remarks, (loco citato,) on Mr Bauer's drying the ovum on a plate of glass in order to preserve it, that he might just as well have boiled or roasted it.

showing the heart and liver of an embryo, (in place of the chorion and yolk of an ovum, which we should have expected to meet with,) induce me to place no reliance on this observation.

I may take this opportunity of mentioning, that, a few months ago, I was permitted, through the kindness of Dr J. Y. Simpson, to examine the uterus of a young woman murdered by her husband in a fit of jealousy, apparently, as some signs at least seemed to indicate, within a short time after impregnation had taken place. This woman had been married for several years, but without having had any children. On opening the uterus, a decidual membrane, in the first stage of its formation, was found to occupy the cavity of the uterus, which was somewhat enlarged; and a large *corpus luteum*, exhibiting the plicated structure in great perfection, and having a cavity in its interior, projected from the surface of one of the ovaries; but no ovum could be found in the cavity of the uterus or Fallopian tubes. I observed, indeed, that the fimbriæ of the Fallopian tubes presented a singular puckered appearance, which had contracted the mouth of the infundibula to such a degree, that a small probe only could be passed into them, and had thus formed a bag at the end of each tube containing a number of small gritty, calcareous-looking particles. Such a puckering must, I should think, have acted as an impediment to the entrance of an ovum into the Fallopian tubes.

I have said that no ovum was observed in this uterus nor in the Fallopian tubes; but I ought not to omit the mention of a small and delicate vesicle, about one-sixth of an inch in diameter, which was seen imbedded in the substance of the decidua, not far removed from the opening of the Fallopian tube, on the same side of the uterus as that on which the ovary presented the *corpus luteum*. This vesicle was of so delicate a consistence, that it was destroyed as soon as touched; and I am therefore inclined to think it may have been no more than a small spherical cell in the decidua, for neither a flocculent chorion, nor any inner vesicle corresponding to the yolk, were perceptible.

Dr John Reid has recently made an examination of the uterus of a woman who died suddenly in the waiting-room of the Royal Infirmary of Edinburgh. The existence of a *corpus luteum* in one of the ovaries and the decidua in the uterus make it probable, that conception had taken place a short time previously to her death; but he was not able to discover any appearance indicating the presence of an ovum in the uterus or Fallopian tubes.

In a paper on the early condition of the ova of Mammiferous animals, published in the Philosophical Transactions of London,* Mr Thomas Wharton Jones has described a very small human ovum sent to him by Dr Mackenzie of Glasgow, and which I am inclined to regard as one of the earliest, if not the very earliest, human ovum that has been accurately described, the record of which has come under my notice.

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* Philos. Transact. for 1837, p. 339.

Dr Mackenzie " considered the ovum as three or four weeks old, the lady who passed it having missed one menstrual period, and thinking herself four weeks gone." But unless we suppose that the development had ceased or been much retarded, it is not probable that the ovum was of so old a date as Dr Mackenzie believed. When I speak, therefore, in these pages, of the age of any product, I beg it to be understood, that, unless otherwise expressed, I refer rather to the degree of advancement of the parts of the embryo, than to the alleged or supposed date of impregnation.

The ovum in question was found in the substance discharged, lodged towards the side of the decidual covering, and was nearly of the size of a large pea before being put into spirits. One side of the exterior surface of the ovum was smooth, and the other covered by the villi of the chorion. The whole cavity of the chorion was filled with a fine gelatinous cellular tissue, imbedded in which, towards one extremity of the ovum, was a small round body. This was evidently the vesicular blastoderma, destitute of any vitellary covering. " The embryo had not appeared, though the vesicular blastoderma was undergoing the preparatory changes."

The next ova in point of advancement to that described by Mr Jones are two of those of which I shall give the history in the sequel of this paper. All the others described by authors with which I am acquainted appear to belong to a more advanced period, when the parts of the fœtus and its membranes are formed.

Dr Pockels of Brunswick * gave, in the year 1825, a very valuable and elaborate description of the condition of the human ova in their early stages, in a paper which, notwithstanding some errors into which the author fell, may be regarded as one of the best accounts of the early ovum that has yet been published.

Among fifty ova which Dr Pockels had the opportunity of examining, there were four only which had been passed in abortion between the eighth and the sixteenth day after conception, and which, according to his belief, were at the same time well formed.

Dr Pockels speaks of the embryo as existing in an ovum of eight days after conception, making mention also of the rudiments of the posterior extremities, and of a large vesicle placed near the embryo, which vesicle, according to a theory peculiar to himself, he conceives, gives rise to the amnios by receiving the embryo

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* Oken's Isis for 1825, Heft xii. I regret that, having lately lost the copy of Dr Pockel's paper from the Isis, which I possessed, and as another copy is not to be found in Edinburgh, I can only speak of his observations from my own recollection, and the citations of others.

within it. Dr Pockels also describes ova of ten and twelve days after conception: but it appears to me manifest, from a minute inspection of his excellent drawings, that some of these very early ova are altered from the natural condition, and that others belong to dates considerably later than those given them by Dr Pockels—an opinion in which I was confirmed by an actual inspection of some of the specimens in the year 1831, when I had the pleasure of visiting Dr Pockels at Brunswick. I may here remark, that the opinion advanced by Dr Pockels, that the amnios of the human fœtus consists of a large and distinct vesicle, which is at first unconnected with the embryo, and that the embryo acquires its proper amniotic covering by sinking into the interior of this vesicle, is wholly at variance with the analogy of all animals, and, indeed, in the present advanced state of our knowledge of this subject, wholly untenable. Upon this subject, however, I shall reserve my farther remarks for the sequel of this paper.

Dr Pockels has described and figured most accurately the appearance of the umbilical vesicle or yolk sac, at the time when it is attached to the embryo by a very short pedicle; and he also has described another vesicle placed nearer the caudal extremity of the embryo to which he gives the name of erythroid vesicle, regarding it as a peculiar production in the human ovum; but Baer and Coste have shown, in my estimation satisfactorily, that this vesicle corresponds with the allantoid or urinary vesicle of other animals.

M. Coste,* trusting to the observation of Sir E. Home and Mr Bauer, already referred to, the validity of which he fully admits, founds some of his views respecting the early condition of the human ovum upon this observation. He has also given a very accurate description, accompanied by drawings, of a very early ovum which he dissected.

The size and shape of this ovum were those of a small hazelnut: the chorion was distinctly villous. The body of the embryo was perceived on the chorion being divided; it was "a line and a-quarter long, and a line and a-half broad," of an oval shape, and presented, on the abdominal surface, an elliptical opening half a-line long; through this opening there were fixed, to the abdominal surface of the embryo, the pedicles of two vesicles, one nearly opposite to the middle of the body, the other nearer to the caudal extremity. These parts are all well shown in the 4th figure of Plate 3. of M. Coste's work, executed by M. Chazal, whose talents for anatomical drawing are sufficiently well known. M. Coste has shown, I think satisfactorily, that one of these vesicles corresponds to the umbilical vesicle, and the other to the allantoid membrane.

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* Cours sur le Developpement de l'Homme et des Animaux, &c. Vol i. Paris, 1837. See particularly p. 189, et seq.

While M. Coste has corrected one or two of the errors into which Dr Pockels had fallen, and has replied successfully to the critique of his work made by Messrs Velpeau and Raspail, he seems to me to have himself been led into important errors upon several points. He supposes that the amnios of the human fœtus, as well as of other mammiferous animals, is first formed by the detachment or raising of the outer covering, or epidermis of the fœtus. Surely in advancing so strange an hypothesis, M. Coste must have overlooked many observations by which it may be proved that the amnios is formed by the union of the cephalic and caudal folds of the serous layer of the germinal membrane in the Mammalia, nearly, if not exactly, in the same way as was shown to take place in birds by Pander, the founder of the modern history of development. Of this mode of formation I have myself had abundant proofs in the ova of the cat, sheep, and rabbit, in all of which animals I have examined the amnios in its open state before the union of its cephalic and caudal folds. M. Coste seems, in his description of the formation of the amnios, to have been misled by the very rapid changes of appearance which that membrane presents at different stages of development, its being completely formed in the human ovum at a very early stage of advancement as compared with birds,—its close proximity at first to the surface of the body of the embryo,—and its subsequent rapid, and great enlargement, when it leaves the surface of the embryo, and forms rather a lining to the chorion: the last being one of the circumstances peculiar to the development of the human ovum, which, I am inclined to think, is frequently connected with its abnormal condition, and which has very frequently led those who have described it into error.

In subsequent parts of his work the confusion introduced by M. Coste's considering the chorion and vitelline membrane as synonymous, is altogether surprising in one who has enjoyed such excellent opportunities of studying the subject of development, and who has given to the public several new and valuable observations regarding this branch of science.

The age of the product of conception described by M. Coste was not known with certainty. Sufficiently aware of the fallacies to which the determination of the age of aborted products is exposed, he is induced, by comparing it with those described by Dr Pockels, and from other circumstances, to regard it as of a date between sixteen and twenty-five days after conception; with which calculation the structure of the ovum and fœtus appears to correspond. At the same time it must be remarked, that, according to the history of the case, one month is the lowest age that could be assigned to this product, and this discrepancy between its apparent and its computed age is only another proof of the extent of the variations to which the progress of development of the human ovum is subject in the early periods of gestation.

M. Velpeau, in his work on Human Embryology,* states, that he has had an opportunity of examining three human ova which were not more than twelve days old. Their volume was equal to that of a large pea, and they resembled one another exactly in form. The first presented the appearance of a simple free vesicle with a villous covering; the second exhibited some appearances, though doubtful, of the formation of an embryo; and the third, M. Velpeau with reason avers, is one of the most valuable specimens of the human ovum that has been seen. This ovum was obtained from a midwife who aborted on the thirteenth day after conception. This lady had previously had six children, and as, upon the occasion referred to, her husband returned to her, after an absence of six weeks, the day before that from which conception was dated, there is every reason to regard the age of this specimen as having been accurately established; a circumstance which, joined to the apparently perfectly natural condition of the parts, gives to this observation a high degree of importance. The chorion was villous. The umbilical vesicle, and the amnios inclosing the embryo are all represented in M. Chazal's beautiful drawings; † but the description of the ovum is so meagre that we are left altogether in the dark regarding the more interesting points of structure which might have been elucidated by a sufficiently minute and accurate examination.

M. Velpeau's observations on the early state of the amnios, as given at page 25 of his work, show that his notions on this point are by no means precise.

In a recent number of the Lancet, ‡ the late Mr Miller, an ardent student of anatomy, has described a very early human ovum, the external diameter of the chorion of which was only five lines; but although it is apparent, even from the imperfect drawing with which Mr Miller's letter in the Lancet is accompanied, that the specimen is valuable as affording a natural view of the parts in the earliest condition of the fœtus; yet his description of these parts is extremely defective, and contains several serious errors. Mr Miller describes, for example, the germinal disc or spot as apparent on the external surface of the chorion, while the fœtus enveloped in its amnios lies within, and he regards the amnios and allantois as formed from one membrane,—statements which those possessing an acquaintance with the laws of fœtal formation know to involve impossibilities.

Professor Mayer of Bonn has described and figured in his

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* Ovologie Humaine, &c. Folio. Paris, 1833, p. 77.

† See Velpeau's Work, plate i. figs. 1 and 2.

‡ Lancet, 1837-8, Vol. i. p. 258.

Icones Selectæ, * a human ovum, about half an inch in diameter, and said to be three weeks old. The fœtus is represented as inclosed in its amnios, which was not far removed from the surface of its body; and the umbilical vesicle is shown attached to the body of the embryo, by a very short, but at the same time a narrow duct.

Professor Müller, in his Jahresbericht of the progress of anatomical and Physiological Science for the year 1833,† gives an account of an early human ovum of 7—8 lines in diameter, which, from the history of the female aborting it, might be either nine or thirty-four days old. The embryo was 2½ lines long, inclosed in an amnios, which adhered closely to the surface of its body. The umbilical vesicle, 1½ line in diameter, was united to the intestine by a very short duct, or rather by a slightly contracted portion three-fourths of a line in length.

I shall conclude this notice of the statements of authors respecting the structure of the human ovum in the first three weeks subsequent to conception, by a reference to the observations of Baer, contained in his interesting lectures on development, quoted in the commencement of this paper; in a few pages towards the conclusion of which‡ there is embodied a short but comprehensive and accurate account of most that was known at the time regarding the early condition of the human fœtus; and to which some interesting original observations are added by the author.§

In the beginning of this paper I have mentioned the observations of Baer on the state of the uterus, in a woman dying eight days after conception. According to this observer it is probable that the period at which the ovum enters the uterus is subject to considerable variation in the human species, as well as in some of the lower animals. Baer conceives that the formation of the embryo may vary in the time of its commencement from the seventh to the twelfth day, allowing that the little body described by Sir E. Home and Mr Bauer was an embryo, which he is much disposed to doubt.

Baer also holds it as established that no human ovum has yet been observed in the cavity of the uterus of which the chorion was not more or less covered with flocculi.

The ovum consists at first of two vesicles, the external, consti-

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* Icones Selectæ Præparatorum Musæi Anatom. Bonon. Tab. vi. figs. 3 and 4.

† Müller's Archiv. 1834, p. 8.

‡ Vorlesungen uber Entwickelungsgeschichte, Vol. ii. p. 264.

§ The "Studien zur Entwickelungsgeschichte des Menschen," to which Professor Baer refers, as giving a fuller account of his investigations concerning the human ovum, I regret that I have not had an opportunity of seeing; nor the extract of them contained in Siebold's Journal fur Geburtshülfe, Vol. xiv. heft. 3, Leipzig, 1835, from which some notices are taken in the first volume of the British and Foreign Medical Review, p. 238.

tuting the chorion, the internal, the yolk, upon the surface of which the rudiments of the embryo are first formed when it has received a covering from the germinal membrane, which thus forms the yolk-sac or umbilical vesicle. The gradual separation of this vesicle from the fœtus by the contraction of the umbilical duct, which Baer regards as probable, is demonstrated by the specimens which I am about to describe.

Baer has also shown, by the examination of a human ovum of fourteen days after conception, the minute description of which I regret I have not access to, that the germinal membrane or blastoderma separates, like that of birds and quadrupeds, into "an animal and vegetative layer," (1. the serous, and 2. the vascular and mucous layers of Pander,) from the first of which he holds that the amnios is formed in man and in the Mammalia generally, exactly in the same manner as is well known to occur in birds; and he very ingeniously suggests, that the false amnios (of Pander) furnishes an external serous covering to the fœtus, which soon becomes irregularly disposed over the surface of the amnios and yolk. This I have frequently observed, and I think it probable that this false amnios may be the occasion of several errors which have been committed in the description of the membranes of the early ovum.

In the last place, Baer has shewn that the allantoid membrane, or at least the inner portion of the urinary membrane, has in the first weeks of gestation, the form of a small pyriform vesicle, attached by its pedicle or urachus to the caudal extremity of the rudimentary intestine, and not, as many, and among others M. Velpeau, have endeavoured to prove, an extended membrane lining the whole space between the chorion and amnios.

In two abnormal human ova I have met with the vesicular appearance of the allantois described by Baer; but I cannot say that I have been, like him, successful in showing it in all ova below the age of five weeks, that I have had an opportunity of observing. This vesicle has been well described by M. Coste, and it appears to be the same with that called by Pockels the Vesicula Erythroides.*

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* I ought here to refer to some other authors who speak of the early condition of the human ovum; Dr John Burns' "Observations on the Formation and Structure of the Human ovum, in the second volume of this Journal, p. 1, 1806." Mr Stanley's "Case of Death by Poison, wherein impregnation had taken place, and the ovum was detained in the ovary," in the 6th volume of the Medical Transactions of the College of Physicians of London, p. 414, 1820; and the remarks in Dr Robert Lee's interesting paper on Double Uterus, and the Membranes of the Human Ovum, in the 17th volume of the Medico-Chirurgical Transactions of London, p. 474, 1832. But though in these several papers, and more particularly, in the last, there are very valuable remarks on the condition of the early human ovum, there is a want of that precise information regarding its structure to which our attraction is at present directed. I have not had an opportunity of seeing Professor Seiler's work on this subject.

Ovum, No. I. Plate II. Figs. 1, 2, 3, and 4.

This ovum I was kindly permitted to examine by Professor Cumin of Glasgow in the course of last autumn. There are no certain data from which the age of this product can be established. It was passed in abortion six weeks after the last menstruation ; but from its size can scarcely be regarded as more than twelve or fourteen days old, if so far advanced even as that period. Its external diameter, when freed from a small quantity of adhering decidua, was $\frac{9}{40}$ of an inch; but the specimen had undergone some contraction from being immersed in acetic acid, and diluted alcohol. The chorion presented a slightly villous appearance on its external surface, the villosities being rather longer and more thickly set at one side than the other.

On carefully opening the chorion, which consisted of one layer of membrane only, an opaque vesicle, viz. the yolk-sac, or umbilical vesicle, was observed in the interior, and on one side of this there lay a minute body, which could be no other than the rudimentary embryo.

The umbilical vesicle and embryo did not fill the cavity of the chorion completely, the diameter of the vesicle being only very little more than half that of the chorion. The embryo was a line in length, and nearly $\frac{1}{40}$ of an inch in thickness. The space intervening between the outer surface of the umbilical vesicle, and the inner surface of the chorion, was occupied by a thin tenacious web of albuminous filaments, probably formed by coagulation in the spirits ; and towards the back of the embryo, and on the opposite side of the umbilical vesicle, this substance was more dense than elsewhere, and united both the fœtus and umbilical vesicle firmly to the chorion. I have more than once remarked this union, which opposes some difficulty to the examination of early ova.

I could not distinguish any external membrane of the yolk-sac, or umbilical vesicle corresponding with the vitelline membrane ; this part being covered by the granular germinal membrane or blastoderma only, which appeared to be separable into several layers. I could not see any blood-vessels on the yolk-sac, though an irregularity of the surface seemed to indicate their existence.

The embryo was in the very earliest stage of its development, for it lay with its abdominal side nearly flat on the surface of the umbilical vesicle, the abdomen presenting no appearance of intestine as yet, but merely a long and shallow intestinal groove, which formed a common cavity with the interior of the yolk-sac. The corrugated appearance of the dorsum of the embryo represented in Fig. 4 is probably not natural, but produced by the action of alcohol or by other causes. Around the intestinal groove, the germinal membrane of the fœtal parietes was continuous with that on the surface of the yolk-sac. One extremity of the embryo, apparently corresponding with the cephalic extremity, was considerably thicker than the other, and had a rounded form, as seen in Fig. 4, an appearance which differs somewhat from that which I should expect to find in a perfectly natural condition, and which in this instance I believe to have been the effect of accident.* A more opaque and expanded portion between the cephalic extremity of the embryo and the surface of the yolk appears to me to indicate the place of a rudimentary heart.

This ovum, then, appears to be intermediate in its advancement between that to which I have referred above, as being described by Mr. T. W. Jones, and those of Velpeau, Pockels, and others, in which the fœtus had attained a more advanced stage of development. With the exception of the degree of corrugation or alteration in the form of the dorsal part of the fœtus to which I have referred, the appearance of the ovum seems natural, and this more particularly as respects the relative size of the parts to one another. It affords an example of the earliest condition of the human fœtus which has been yet observed; when in all probability, the primitive folds have just united to form the vertebral canal, and when the intestinal folds of the mucous and vascular layers of the germinal membrane have not yet by their union given rise to the simplest form of intestine. The circulation of the blood might be begun or about to commence.

This specimen shows also two remarkable peculiarities of the human ovum; 1*st*, the very small size of the embryo in the earliest stages of development, as compared with that of other animals, and 2*d*, the very early period at which the yolk is inclosed by a complete covering of the germinal membrane,—a circumstance in which it bears some analogy to the ovum of some of the aquatic Batrachia, as of the common newt.

Ovum, No. II. Plate II. Figs. 1, 2, 3 and 4.

The second ovum which I shall describe is in the possession of Dr John Reid of this city, who kindly permitted me to examine it.

It was procured from the uterus of a woman, aged 20, who died after an illness of a fortnight's duration. This person was married six weeks before her death, to a man with whom she had cohabited for a year before their marriage, and by whom she had had one child. The last menstruation ceased on the 24th of May 1838; her husband, a labourer, visited her at the end of every week, and her death took place on the 1st of July, that is, five weeks and one day after the first visit of her husband, succeeding to her last menstruation. But the whole size of the ovum and structure of the fœtus do not warrant us in considering the ovum as dating from so early a period as five weeks before her death: and three weeks even appear to me too long a period; unless, indeed, it be supposed that the illness under which this woman laboured for a fortnight before her death had put a stop to, or retarded the development of the ovum, which is not improbable from the large size of the chorion, as compared with the fœtus and umbilical vesicle. When we consider the size of the ovum, and some other circumstances,* there seems some reason to think that the commencement of her illness and her impregnation may have been connected with one another, or have been nearly at the same period of time. From these considerations, I am inclined to regard the ovum as probably dating little more than fifteen days from conception.

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* This appearance I have represented as I saw it, being afraid of attempting to remove it by touching the fœtus with a small instrument. I must here take the liberty of stating as an apology to the reader, for the imperfection of my account of this ovum, that the examination of it was made in a bad light, and when, being from home, I had none of those delicate instruments or other aids by me which I am in the habit of using in such researches.

The uterus was carefully removed from the body, and all the parts attentively examined by myself, in company with Dr Reid and Dr J. Y. Simpson, before they had been immersed in alcohol. The size of the uterus was nearly one-half larger than in the unimpregnated condition. The left ovary presented the most perfect specimen of the *corpus luteum* in process of formation, which I have ever seen in the human female. A considerable cavity existed in the interior of the *corpus luteum*, the aperture of which on the surface of the ovary was quite closed. The yellow substance of this body formed rather a regular plicated lining to its cavity than a solid, rounded, and projecting mass.

On cutting through the uterine parietes, the decidua adhering to the inner surface of the mucous membrane presented, throughout its whole extent, small blood-vessels, which passed from one membrane to the other. The exterior of the *decidua vera* measured about two inches in length; the thickness of its walls was generally about one-fourth of an inch. The cavity of the decidua was occupied by the usual fluid, and from the posterior wall of the *decidua vera* there projected forwards the swelling of the *decidua reflexa*, containing the ovum imbedded in its substance. This swelling of the *decidua reflexa* was about three-fourths of an inch in diameter. On cutting through this membrane, the villi of the chorion made their appearance.

The greatest diameter of the ovum (or chorion) measured six-tenths of an inch, the lesser four and a half tenths. The villi of the chorion, as is seen in Plate II. No. II. Fig. 1, were considerably more numerous and more branched on one side than on the other.

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* This woman is stated to have died with the symptoms of chorea.

The examination of the interior of the ovum was unavoidably postponed till after it had been kept in alcohol for some time. On cutting through the chorion, which seemed to be composed of one layer only, its cavity, No. II. Fig. 2, was seen to be filled by a web of fine shreds of a substance which I mentioned in the last described specimen, and the same, I presume, as that to which M. Velpeau has given, in ova of a later date, the name of *corps reticulé*, imbedded in which, and situated towards one extremity of the chorion, was the embryo with its yolk-sac. Both embryo and yolk-sac were attached to the interior of the chorion by a denser portion of the reticulated substance, and much in the same manner as in the ovum, No. I., that is, the dorsum of the fœtus, and the opposite side of the yolk-sac being the most attached portions. The length of the fœtus was nearly one-tenth of an inch; that of the yolk somewhat less, or about one-twelfth.

The fœtus, as in the ovum first described, was not united to the yolk-sac by a pedicle or umbilical constriction, but lay nearly flat, with its abdominal side opposed to the surface of the yolk, there being a distinct continuity between the germinal covering of the yolk and the sides of the fœtus. The fœtus is in the earliest stage of development. The vertebral canal, in which the cephalic and caudal extremities are without difficulty distinguished from one another, are considerably more distinct than in the first described ovum. By viewing the fœtus at its extremities, I could also perceive that the groove of the vertebral canal was (whether from accident or naturally I cannot decide) open more or less in its whole extent. Below this rudiment of the cerebro-spinal axis, an intestinal groove, more perfect than that which was seen in No. I., existed; and from the accidental rupture of a small portion of the caudal extremity of the embryo, I was enabled to see through the intestinal groove into the interior of the yolk, with which the intestinal groove formed a common cavity. Below the cephalic extremity of the embryo, and between it and the yolk, an irregularly shaped mass was seen, which may indicate the place of the heart, if it is not itself that organ.

There was neither any allantoid membrane nor amnios. I would call the attention of the reader, however, to a portion of fine membrane which adhered to the notch between the fœtus and yolk at the cephalic extremity, and which had the appearance of a portion of the reticulated body, denser and more membranous than the rest, which turned slightly over the head of the embryo, and caused its firm adhesion to the inner side of the chorion. I am inclined to believe that this piece of membrane may be a part of the cephalic fold of the serous layer of the germinal membrane which forms the amnios. The remarks of Professor Baer, in his work already referred to, have satisfactorily disproved the views entertained by Pockels and Coste respecting the mode of formation of the amnios; and although no direct observations have as yet been adduced, in which the ununited state of the cephalic and caudal folds of the amnios has been seen in the human fœtus, there can now be no doubt that, in this respect, the human ovum does not differ from that of other animals.

I was not able in this example to perceive the omphalo-mesenteric blood-vessels on the surface of the yolk, although the same marks of which mention was made in the description of the first ovum, seemed to me to indicate their presence.

The ovum, then, which is figured in No. II. affords an example, in which, although the development of the chorion is somewhat advanced, the embryo itself, and the parts immediately connected with it, are in a very early condition. Though the embryo and yolk-sac of this ovum are smaller in size than in the ovum No. I. the more distinct form and greater consistence of the parts incline me to believe that they, as well as the chorion, were in a slightly more advanced stage of development. We have here the yolk covered by the layers of the germinal membrane forming the yolk-sac or umbilical vesicle; the embryo consisting principally of the rudiments of the cerebro-spinal axis and the intestinal groove, and in which it may be supposed that the heart also has been formed in its first or simplest condition,—a state of the parts, which, if such a comparison can be made, approaches to that existing in the incubated egg of the fowl at the thirtieth or thirty-fifth hour.

Ovum, No. III. Plate II. Figs. 1, 2, and 3.

The last of the ova which I shall now describe belongs to a period considerably later than either of the preceding specimens. It was given to me in 1834, by Mr Sidey of Edinburgh, to whose kindness and scientific zeal I have frequently been indebted; as having been passed six weeks after the end of the last menstrual period, by a person who had previously born children. In so far as the ovum, as a whole, is concerned, it is manifestly one of the date of five or six weeks; but it is one of those products so frequently met with in abortions, which, from a want of correspondence in the development of the membranes of the ovum and the parts of the fœtus, some parts of the product having been arrested in their development, may serve for the illustration of the structure at an earlier period than that at which the ovum is passed. The fœtus, in fact, and umbilical vesicle of this specimen form a link in the series of early ova not far removed from those previously described.

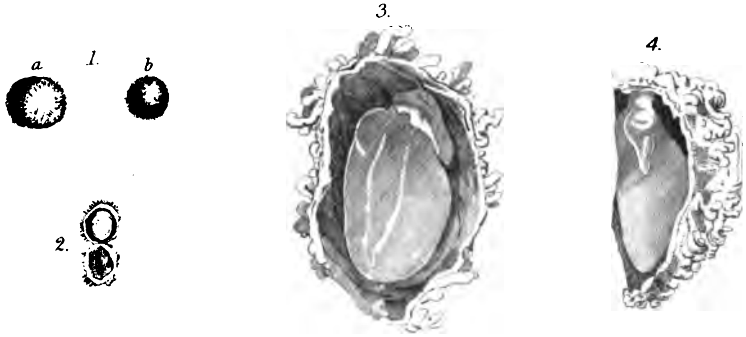
The chorion, about an inch wide in its longest diameter, presented a considerable number of villi of moderate size, and, as usually happens, in greater quantity on one side of the ovum than on the other; that is, on the side on which the placenta would afterwards have been found. The interior of the chorion was filled with a flocculent fluid, and the embryo with the umbilical vesicle adhered to the inner side of the chorion, as seen in No. III. Fig. 2.

The fœtus, represented magnified ten diameters in Fig. 3, was about one-eighth of an inch long, its body nearly one-thirtieth of an inch thick. In this example the embryo consists of the rudiments of the head and vertebral column, forming the head and trunk of the body. There is as yet no appearance of the extremities. The vesicles of the brain are slightly visible, and the sacral part of the vertebral column is prolonged at the caudal extremity. I could not perceive the rudiments of the eye or ear, which, nevertheless, I believe, must have been present. The heart hung forward from the body of the embryo, without any covering, and having the simplest form belonging to that organ in the early stages of development, viz. a curved tube, one extremity of which, corresponding to the bulb of the aorta, was attached to the forepart of the neck, while the other extremity, corresponding to the auricular part connected with the veins, was attached to the body of the embryo farther back. In a subsequent paper I hope to be able to show the successive changes by which, in the human fœtus, this simple incurved tube, like that of birds and quadrupeds, is gradually converted into the perfect heart of advanced stages of development.

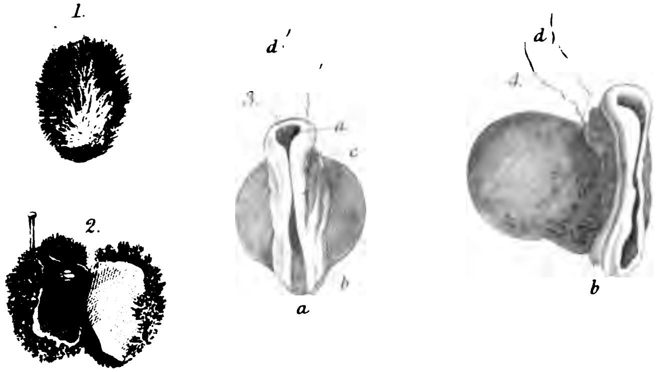
The intestinal canal formed a simple and straight tube. The mouth was open, but no anus was yet formed at the caudal extremity. In the middle part of the body of the embryo, the intestinal tube opened by a wide aperture into the umbilical vesicle, which now no longer lies below and supports the fœtus, as in the two previously described ova, but begins to be separated from it by a more constricted portion, which would afterwards have been elongated and narrowed into the small pedicle or duct by which, in the fourth and fifth weeks, and at a later period, the umbilical vesicle is attached to the intestine. A few of the omphalo-mesenteric vessels were visible on the surface of the umbilical vesicle.

The posterior extremity of the intestine opened into, or rather was continuous with, a tube, by which the embryo was firmly attached to the chorion. This tube had the shape of a funnel, or was somewhat pyriform, manifestly constituting the urachus. It is possible that the dilated part immediately adjacent to the fœtus may have contained the pyriform vesicle which Baer considers as the allantois, although I was not able in this instance to satisfy myself of its presence. I have, however, in two abnormal ova, observed the vesicle described by Baer as analogous to the allantois.

HUMAN OVUM.



I.



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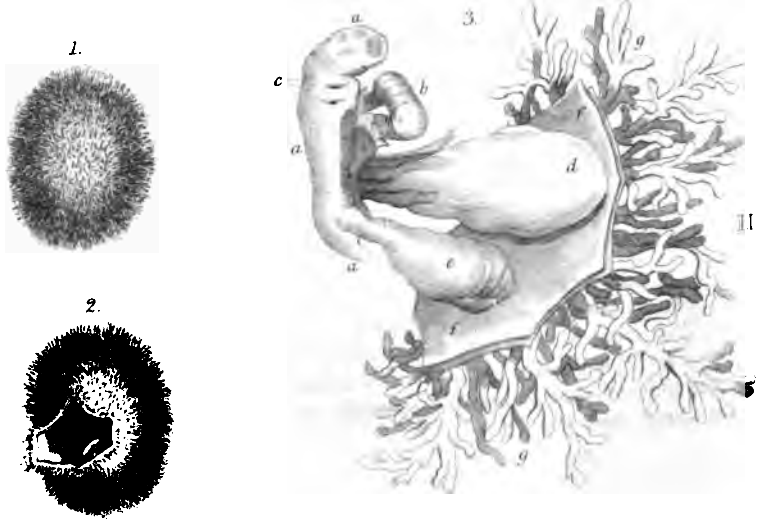


III.

G. Aikman, Sc

Two very small branchial slits were visible in the neck of the embryo, which from their position appear to be the two first of the four which exist at a later period. In a subsequent paper I shall mention human fœtuses in which I have observed four branchial slits existing at one time.

No amnios was to be seen covering immediately the body of the embryo. In the first examination of this specimen made five years ago, I thought I perceived the amnios lining closely the chorion, and I considered this as one of those examples in which the amnios had taken on a growth disproportionate to that of the fœtus. Since the perusal of Professor Baer's remarks, however, in the second volume of his Entwickelungsgeschichte, I begin to think I may be mistaken with regard to this point. From numerous observations which I have made on mammiferous animals, I am satisfied that in them all, the amnios is formed exactly in the same manner as in birds; and from some observations which I have lately made in human ova, I am convinced that they form no exception to the general law first established by Pander. I may here briefly mention, that although I have never as yet in the human ovum, found the cavity of the amnios open posteriorly, before the meeting of the cephalic and caudal folds of the serous layer of the blastoderma, I have remarked after the completion of the formation of the amnios, the remains of the false amnios (of Pander) adhering at the point of junction to the outside of the amnios itself, an appearance which I shall take another opportunity of describing more minutely.

In concluding, I may remark that the investigations of which I have given the history, have been undertaken under the great disadvantage of having very few specimens for examination, and I take this opportunity of requesting those who are so fortunate as to obtain early human ova, and do not wish themselves to make use of them, to allow me an opportunity of examining them.

In the next number of this Journal it is my intention to continue the present paper by a description of the structure of the human ovum and embryo in the fourth, fifth, and sixth weeks after conception.

Description of Plate II.

No. I.

Fig. 1. Exterior of the ovum represented of the natural size.

a. Shows some decidua adhering to the surface of the chorion.

b. The chorion when that portion of decidua had been removed.

Fig. 2. The chorion split into two halves, showing in the upper section the yolk-sac or umbilical vesicle, with a lateral view of the fœtus lying upon it.

Fig. 3. The same magnified six diameters: The fœtus occupies the upper part of the figure, the cephalic extremity being turned towards the left hand of the reader; at the lower side of the yolk-sac, the reticulated membrane, causing its adhesion to the inside of the chorion, is seen.

Fig. 4. The same specimen turned round so as to obtain a view of the dorsal aspect of the embryo. The cephalic extremity of the embryo is uppermost in the figure.

No. II.

Fig. 1. Exterior of the chorion as seen after it had been removed from the decidua, of the natural size.

Fig. 2. The cavity of the chorion laid open, showing in its upper part the yolk-sac with the embryo lying across it: these are fixed in the situation in which they are represented in the figure by the reticulated substance.

Fig. 3. The yolk-sac and embryo removed from the interior of the chorion, and represented as magnified ten diameters. The cephalic extremity of the embryo is uppermost in the figure, the dorsum being directed towards the reader; the open state of the vertebral canal is seen, *a a.*

Fig. 4. A lateral view of the same specimen, which exhibits, *b*, the folds of the intestinal grove and the part indicating the place of the heart, *c*, between the fœtus and the yolk-sac; *d* is a piece of membrane which may be connected with the formation of the amnios.

No. III.

Fig. 1. Exterior of the chorion, of the natural size.

Fig. 2. A portion of the chorion cut through and everted, so as to show its cavity and the embryo with its appurtenances adhering to the internal surface.

Fig. 3. The fœtus removed from the chorion along with the umbilical vesicle and a portion of the chorion, and represented magnified ten diameters.

a. a. a. Head and body of the embyro.

b. The heart in the form of a bent tube.

c. Two branchial slits.

d. Umbilical vesicle or yolk-sac.

e. Pyriform part connecting the caudal extremity of the intestine and embryo with the chorion.

f. f. Inner surface of the chorion.

g. g. Its flocculi.

ART. VIII.—*Case of Malignant Tumour of the Lower Jaw, treated by Excision in the Northern Infirmary at Inverness.* By H. A. MANFORD, Surgeon, Licentiate of the Faculty of Physicians and Surgeons Glasgow, and one of the Medical Attendants to the Northern Infirmary and Lunatic Asylum, Inverness, &c. &c.

MARGARET MACLENNAN, a healthy-looking woman, aged 46, who stated that she is a widow, and the mother of four children, was admitted into the Northern Infirmary at Inverness, from the parish of Lochalsh, Ross-shire, on 7th October 1838.

About eighteen months ago she began to complain of toothache and swelling of the right side of the lower jaw, which, in the course of a few months, ended in the dropping out of two of her teeth; a third, situated about the centre of the affected part, continued to be the seat of much pain, when, six months from the commencement of her complaint, she applied to a neighbouring medical gentleman, who extracted the tooth, and relieved the pain. The part never healed, and has discharged quantities of matter occasionally since. On admission, the face appears distorted, with fulness of the right side of the lower jaw. On looking into the mouth the whole side of lower jaw, stretching from the last *dens molaris* to the *symphysis menti*, is involved in one sarcomatous-looking tumour. It feels hard and unyielding, indicative of the bone being affected, and is encroaching on the neighbouring soft parts, especially the root and side of the tongue, which are slightly involved, pushing the tongue to the opposite side. On its middle and upper surface is a small ulcerated cavity, the site of the tooth which was extracted having a fungous aspect. On introducing the probe it passes downwards for about an inch, but discovers no carious bone, the parts feeling soft and pulpy. Complains of occasional and severe darting pains through the tumour, in the direction of the angle of lower jaw. The last *dens molaris* and two incisors feel loose; general health pretty good; functions natural.

She was ordered a draught of infusion of senna with Epsom salts.

17th. Removal of the diseased part having been determined on this day, agreeably to the result of consultation, the last molar and four front teeth were extracted, and the purgative draught was repeated yesterday. She had this morning an anodyne draught, all preparatory to the operation, to which, though rather depressed in spirits, she was perfectly willing to submit. It was performed in the following manner.

An incision was made down through the lower lip, a little beyond the *symphysis menti*, to the edge of the bone; it was carried along the base of the jaw close to its angle, afterwards up the ramus at a right angle, to about an inch and a-half. At this stage two vessels were secured. The triangular-looking flap was then dissected up, and soft parts also freed from the bone under its base. The bone was then made bare close to the angle, and also at where the incision was first commenced, near the symphysis of the chin. Afterwards a groove was made by means of the metacarpal saw, and the jaw snipped across at both places with Liston's forceps. The portion of bone was then depressed, drawn forwards, and dissected out, care being taken to keep the tongue from falling back. Two more vessels were then secured. Hemorrhage from the ramal end of the bone proving rather troublesome, it was arrested by the actual cautery, which was also applied to the soft parts under the tongue. The parts were afterwards cleansed of blood, put in apposition, and retained by means of two harelip pins and six stitches. Adhesive strap and a bandage were then applied; oiled lint in proportion to the size of the removed part was employed to fill up the vacancy, and the patient put to bed. She bore the operation well, and lost very little blood. Feeling rather faint, about half a wine glassful of port wine was given. She was ordered to be kept quiet, and nourished with water-gruel through the spout of a tea-pot.

At 7 P. M. makes herself intelligible by signs that she feels quite easy; oozing of blood which followed the getting into bed has ceased; pulse 84. The anodyne draught, which was composed of the solution of the muriate of morphia and cinnamon water, was ordered to be repeated at bedtime.

18th. Passed a good night, having slept for several hours, and continues to make herself understood that she is comfortable and easy. Little or no swelling of the face; the skin is moist; and the pulse 88, soft.

To continue to be kept quiet, and to lie on the sound side, in order to prevent the saliva, which is rather copious, from acting on the cut parts.

25th. The reports of the Case Book bear, that since last, she has been daily improving, and that she is now (eight days from the operation) able to walk about the ward. The ligatures have all come away, the stitches removed, the ends of the bone covered with granulations. The wound on the 20th is reported to be so united throughout as scarcely to leave any mark, and that the swelling of the parts is subsiding. She has complete command of the tongue, and slept well without an anodyne for the last three nights. The appetite improves; the tongue is clean; pulse 84, soft and regular. The bowels were opened by castor oil.

Charpie moistened with a weak aqueous solution of the chloride of lime, from which she has derived very considerable relief and comfort, is ordered to be continued to fill up the vacant space in the jaw; and also to continue nourishing diet,—which she has had for the last three days.

6th November.—The parts are now completely cicatrized, and

VIEWS REFERRED TO IN MR MANFORD'S CASE.

Fig. 1.

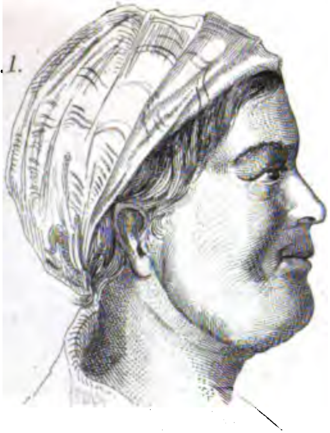


Fig. 3.

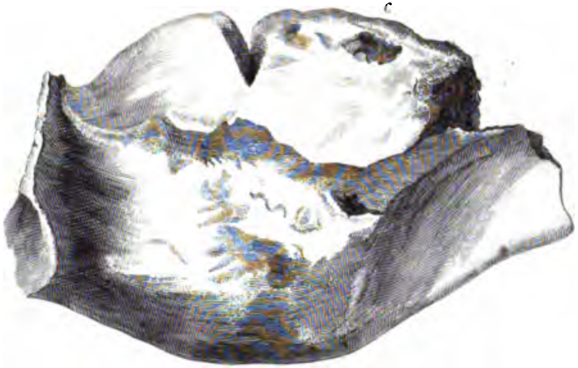


Fig. 5.

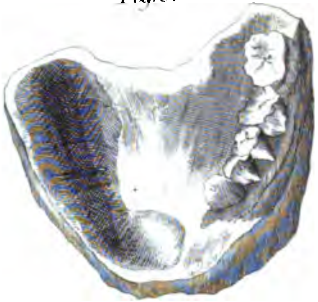


Fig. 2.

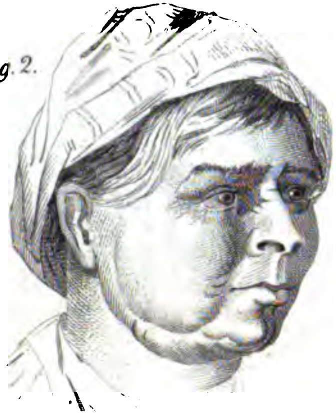


Fig. 4.

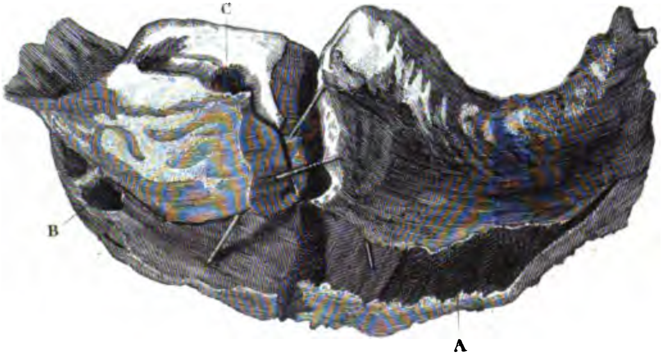
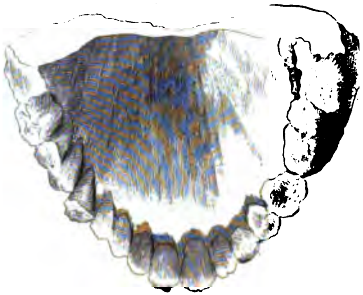


Fig. 6.



G. Aikman, Sc.

braced by the use of an astringent gargle, and her general health much improved by a course of sarsaparilla in the form of decoction. She speaks distinctly, and moves the tongue, and what remains of the lower jaw freely and voluntarily. Being now perfectly free of complaints, she is this day dismissed cured.

Morbid appearances, and remarks on the prefixed case.—The weight of the diseased mass was found to be nearly sixteen drachms. The integuments were highly vascular. On making a longitudinal section of about four inches along its anterior surface, the bone was discovered to be almost entirely absorbed, the knife communicating the sensation as if cutting through a piece of silk paper put upon the stretch or tense membrane. This was confined to the surface. At its ramal extremity nearly a teaspoonful of thin straw-coloured fluid spurted out from a cavity, (vide A. drawing, No. 4,) much of the same shape, and capable of containing, an almond. This and the diseased structure were more fully brought into view by a crucial incision, which exhibited all the characteristics of osteo-sarcoma. Its consistence was firm, fibrous-looking, and had a whitish-brown appearance. Three cells of an oval shape, (vide B. drawing, No. 4,) and in each of which an orange seed might lie, were observed in the centre of the mass. On holding it between the eye and light, the posterior part (vide drawing, No. 3,) of the bone was observed as it were to be pushed back, much attenuated, and quite diaphanous through the section. It felt somewhat elastic. The excised extremities of the bone had a healthy natural aspect.

Church Street, Inverness, 26th January 1839.

ART. IX.—*Report of various Surgical Cases.* By ANDREW MACKIE, Surgeon, Cupar Fife.

To the Editor of the Edinburgh Medical and Surgical Journal,

SIR,—I enclose the account of a few interesting cases which came under my observation while I was assistant to a practitioner in the north of England.

I. *Case of Brachial Aneurism.*—Mr W. G. of East Aytoun, near Scarborough, was bled in the median basilic about the 20th October 1835, and unfortunately the point of the lancet penetrated the brachial artery. From the blood flowing *per saltum* it was apprehended that such was the case, and, in order to effect a cure, compression was employed, but without any effect, as in three weeks, a pulsating tumour, of the size of a hen's egg, had formed at the elbow, bearing the usual characteristics of aneurism.

In the course of another fortnight the surface of the swelling began to ulcerate, and in a week further, hemorrhage occasionally occurred, which so weakened and alarmed the patient, that he at last consented to submit to the operation of tying the brachial artery above the tumour, which, accordingly, was performed by me, in presence of Mr Smart and Dr Alexander of Scarborough.

The operation was performed in the usual manner, by cutting down upon the artery along the inner margin of the biceps muscle. On tightening the ligature, the tumour almost instantly became flaccid, and pulsation at the wrist entirely ceased. The whole arm was then enveloped in new flannel, and an opiate exhibited, which soon had the effect of inducing tranquil sleep.

Mr G. complained at first of an uneasy prickly feeling in the affected member, and the arm was rather cooler than the other. Sensation was in nowise affected. After reaction had commenced there was a good deal both of constitutional and of local irritation. The affected limb then became much hotter than the sound one, and general throbbing in the whole arm was then felt, synchronous with the pulsations of the heart, and, in about ten days, the pulse was indistinctly felt at the wrist. About this time also the whole aneurismal tumour sloughed away, leaving underneath a clear healthy surface, which rapidly healed. In a fortnight the ligature came away with the dressing, and in three weeks from the date of the operation, the patient had entirely recovered.

Three years afterwards, I had an opportunity of examining the arm, which was equally strong with the other, and the pulsations of either radial artery quite distinct.

II. *Case of Purpura Haemorrhagica.*—In March 1837, W. W. of Wykeham, near Scarborough, blacksmith, was attacked with influenza, which in a few days degenerated into a continued fever. In three weeks, he was convalescing. One morning, on making my usual visit, I was surprised to find covering the whole surface, and more particularly the extremities, a petechial eruption, as if blood was effused in patches under the skin. There were no particular constitutional symptoms. The following was prescribed.

℞ *Acid. Sulphuric. dilut.* ʒi.; *Magnes. Sulphat.* ℥ss.; *Infus. Rosar. rubr.* ℥iiiss. *M. aeger. capt. cochl.* i. *ampl.* 3tiis *horis.*

On calling in the evening, I found that the medicine had opened the bowels, and that blood had begun to ooze from the whole mucous membranes, from the gums, from the nostrils, and from the bowels, while occasionally by coughing, red, florid, and frothy blood was brought from the lungs, and once he had vomited a considerable quantity, as was supposed, from the stomach. The foregoing medicine was now discontinued, and the following prescribed in its place.

℞ *Acid. Sulphuric. dilut.* ʒi.; *Tinctur. Opii* gutt. xx.; *Qui-*

nia Sulphat. ℈i.; *Aquæ Cinnammom.* ℥iv.; *M. aeger. capt. cochl.* i. *ampl. secunda quaque hora.*

The window was partially opened, and the patient was directed to be kept quiet, and every thing he took to be cold. For three days, he continued in the same perilous condition, passing frequently great quantities of blood, so much, indeed, that I was utterly astonished to guess from whence it could all come. He took the medicine regularly, but with seemingly so slight an effect, that I was induced to try the efficacy of acetate of lead, which accordingly, in combination with morphine, I exhibited, and with the most beneficial results, as, after taking a few doses, the hemorrhage entirely ceased.

I had nearly omitted to mention, that, in the previous treatment, a blister had been applied to the chest, and that from the sore, blood continued to ooze during the whole of this period.

The patient was nearly six months in regaining his usual strength. He is now quite well, and last time I saw him, he was hammering away at his usual trade.

III. *Case of Gunshot Wound of the Eye.*—Last October, as a gamekeeper, in the employment of Mr Osbaldiston of Hutton-Bushell, was pointing out some game to a gentleman, he accidentally received two lead corns in his eye. One of these shots penetrated the conjunctiva at the distance of two lines from the cornea, and passing down to the bottom of the eye, betwixt that membrane, (the conjunctiva) and the sclerotic, changed its course, and at length appeared at the margin of the lower eyelid, from which place it was extracted. The other shot penetrated the cornea and the iris, and at length lodged itself, (I suppose,) somewhere in the vitreous humour. Severe lancinating pain was felt, and the vessels of the conjunctiva were instantly loaded with red blood. I rapidly abstracted a large quantity of blood from the arm, so as to produce slight syncope, and ordered cloths dipped in cold water to be kept constantly upon the eye and forehead—and directed the patient to be kept in a dark room, otherwise enjoining the antiphlogistic regimen. In the evening visit blood was again taken, and an anodyne administered. Next day after reaction had set in, the pain became more severe, the eye quite intolerant of light. In fact, iritis had supervened,—Extract of Belladonna was applied around the ocular region, leeches to the temples, and calomel given in large doses according to the following formula.

℞ *Calomelanos* ℈i.; *Antimon. Tartrat. et Pulv. Opii āā gr.* iii.; *Conservæ Ros. q. s. ft. Massa in pil. vi. dividend. quarum aeger capt.* i. *omni secunda hora.*

By these active measures, the inflammatory action was in due time subdued, and a return prevented by a persistence in low diet, &c.

The patient recovered strength, and gradually regained the complete use of vision. There is still a mark left in the iris at the seat of the injury. I had nearly omitted to state, that, shortly after the occurrence of the accident, the iris assumed a greenish appearance, which I also remarked in a case which came under my notice about five years ago, in which a piece of a percussion cap entered the ball of the eye and totally destroyed vision.

IV. *Extirpation of a Nævus.*—In March 1838, Mrs J. of Ayton, brought her child, aged eighteen months, to me. Upon the clavicle was situated a large nævus, of the size of a hen's egg, and capable of being compressed to one-half its size. I recommended extirpation, which was performed in the following manner. A large curved needle, armed with a double ligature, was passed deeply under the middle of the tumour, and brought out at the opposite side; the tumour was then compressed and enclosed by the ligatures, which were drawn tight. In a few days it sloughed off, but leaving a small portion of the diseased mass, which bled profusely. The tincture of the muriate of iron was applied, and compresses properly adapted to the sope; and in about a week, when the dressing was removed, the parts were found to be nearly whole.

V. *Case of severe Gunshot wound of Forearm, &c.*—About the end of August 1838, Mr J. W. D. of Ayton, near Scarborough, was out shooting, and he unfortunately, in passing through a hedge with his gun on full-cock, received its contents in the wrist, part of the hand, and the lower third of the forearm. He had to walk home a distance of one mile in this lacerated condition, with the blood pouring forth in large quantities. By the time he arrived, he was so enfeebled and sick that he fainted, became cold and insensible, and was frequently vomiting. The pulse at the wrist was for some time totally gone, and indeed his friends were afraid that life was extinct. He lay in this distressing state for a considerable time. Several surgeons were soon in attendance. It was found necessary to tie the ulnar and the two interosseal arteries. Brandy, ammonia, &c. were given in small, but frequently repeated doses, and in a short time sensation returned.

The ulna, the tarsal bones, and the radius were severely fractured and comminuted, but a small part of the external half of the latter was fortunately preserved, and the radial artery being secure, it was decided, after a consultation betwixt Mr Smart, Mr Dun of Scarborough, and myself, to give the patient the chance of preserving the limb.

In the meantime, large portions of minced flesh, and nearly twenty pieces of bone, were taken away, lint dipped in cold water placed in the wound, and the arm supported by a splint, and embraced by a proper bandage. An opiate was then administered, which only, however, produced snatches of sleep, and horrible dreams.

In a few days severe reaction occurred, and all the constitutional symptoms generally felt on these occasions developed themselves, accompanied with severe and incessant vomiting, and constant pain. The febrile symptoms were combated in the usual manner, by salines, enemata, &c.

On opening the wound five days after the occurrence of the accident, it was found that sloughing and suppuration had taken place to a considerable extent; and although the local and constitutional symptoms scarcely warranted it, after a consultation, it was judged proper still to continue our saving measures, and if possible preserve the limb. Resinous dressings were applied, and the bandages were kept moist by a lotion, composed of nitric acid and rose water. Along with the continuance of the suppurative process, hectic set in. A considerable addition was now made to the diet, and quinine, wine, and porter were allowed.

The parts now began to assume a more healthy appearance. The purulent matter became more healthy, and smaller in quantity. The general irritation also gradually wore off.

The surfaces were drawn in apposition by stripes of adhesive plaster, and almost daily became more closely united. Suffice it to add, that in six weeks he was wheeled out in a chair, and in a short time afterwards the wound was closed. But still the arm required the support of a splint.

It is satisfactory to add, that he regained the use of his fingers, and when I left Yorkshire, the wrist was gradually becoming more stiff (I suppose from ankylosis), so that the fore-arm and hand would form one continuous lever.

This case presents us with a marked instance of the restorative powers of nature, and should be a lesson to those of my brethren who are more inclined to mutilate and to lop off, than to trust to the slow though sure operations of the living body, in adapting itself to nearly all circumstances.

VI. *Case of numerous small Cartilaginous bodies extracted from the Wrist-joint.*—In August 1837, Miss W. of Swainton, Yorkshire, aged 22, applied to me. There was a large fluctuating tumour on the fore part of the wrist, and another of nearly the same site, but more flattened shape, in the palm of the hand. I ascertained that there was a communication betwixt them from the fact, that part of the contents of the one could with a little difficulty be squeezed into the other, and *vice versa.*

The disease had been in existence for some time, but of late the swelling had become so great as seriously to incommode the movements of the wrist, and to prevent her following her usual occupation, that of a dressmaker. The parts had never received any injury, and the patient could assign no cause for the existence of the affection Blistering, &c. had been previously tried by another surgeon, but without effect.

I recommended an incision to be made for the evacuation of the contents. It was done in the following manner. In order to give it a valvular form, the skin of the fore-arm was retracted as much as possible, and then a large lancet was plunged into the middle of the largest and uppermost swelling. Pressure was then made, and gradually small cartilaginous bodies made their appearance along with a glutinous substance resembling mucilage in its external appearance. In a short time the whole cavity was evacuated.

A bandage wetted in an evaporating lotion, and kept constantly moist, was then applied, and other measures employed with the view of preventing the occurrence of irritation. In a short time she had quite recovered the use of the joint, &c.

The bodies extracted were more than twenty in number, about half the size of a common bean, and of a flattened pyriform shape. In the centre of each was a nucleus harder than the rest of its substance.

Cupar Fife, Feb. 22, 1839.

ART. X.—*Contribution to the Pathology of the Diseases of the Lungs,—Tubercular Excavation, without cough or expectoration, or any apparent symptoms of illness, presenting in an active, muscular, young man, and suddenly proving fatal by rupture of a large blood-vessel.* By D. MACLACHLAN, M. D., Assistant Surgeon 79th Regiment

ACCIDENT frequently discloses extensive organic changes, the previous existence of which were wholly unsuspected: nor does any one organ, however important in the animal economy, appear to be exempt from latent disease. The brain, the heart, and stomach, have each been found altered in structure without the outward, reputed symptoms of derangement of function; and we have an authenticated case on record, of a soldier performing his duties up to the day of his death, with the whole of the right lung converted into one entire abscess. Such remarkable exceptions as these are seldom amenable to art; they advance in secret, and, if in practice, new and unexpected phenomena suddenly rouse our suspicions, and bring them under our cognizance, it is but too often not until they are beyond the control of medicine.

The following case is a good illustration of one of the most frequent lesions of this description,—latent tubercular disease of the lung. Arriving at the stage of softening and excavation, without cough or expectoration, and suddenly terminating fatally by hemorrhage, gives it additional interest. We naturally remark, that, had attention been attracted to the chest, had there been previous cough, difficulty of breathing, or any symptom referable to the state of the lungs, an experienced auscultator would no doubt have detected during life what was only discovered by examination after death ; and, as rest and quiet would probably have been enjoined, there is reason to suppose life might have been protracted, and the fatal event deferred.

Case.—John Laidlaw, a private in the 79th Regiment, aged 22, an active, muscular, well-formed young man, with a capacious and well-proportioned chest, was suddenly seized, apparently without previous ailment, while at light infantry drill in the barrack square, at eleven o'clock on the morning of the 18th January last, with "vomiting" of blood. I saw him five minutes after the attack. Scarlet-coloured blood was then gushing out of the mouth and nostrils. He was in a stooping posture, in the greatest distress, supported by one of his comrades, and the gurgling in the trachea and suffocative breathing gave direct evidence that a large vessel had given way into some part of the respiratory organs. The man was carried to the hospital, a few yards off, and a vein was immediately opened in each arm, while at the same time dry cupping was extensively practised over the chest. The left external jugular vein was also opened. Six or eight ounces of blood were obtained from the orifices, but without the least relief to the breathing or abatement of the profuse hemorrhage from the mouth. He almost immediately became convulsed and insensible, and died in five or six minutes, eleven or twelve hours from the period of seizure.

The body was examined twenty-four hours after death. Percussion elicited a clear sound over the chest. The epigastrium was considerably distended. On removing the sternum and ribs, the lungs presented a perfectly natural aspect. Firm adhesions of both pleuræ existed on both sides. The large vessels with their immediate branches were now carefully searched. This examination being fruitless, and it being observed that pressure on the left lung forced frothy bloody serum out of the mouth, the lung was removed from the body, when a deep puckered indentation presented itself, in the summit of the upper lobe, immediately below and about the centre of the clavicle. This puckering pointed out a collection of small, gray, semitransparent tubercles, altogether forming an induration larger than a pigeon's egg, in the centre of which two caverns, filled with dark coagula, were discovered, communicating freely with each, the one capable of holding a nutmeg, the other about half this size. There were several smaller vomicæ in the mass. The walls of the large excavations had a rough, broken down aspect, as if recently lacerated. There was no lining membrane, and no appearance of purulent matter. The openings of the bronchial tubes in these cavities, four or five in number, were filled with clotted blood, and the ruptured vessel presented a gaping orifice easily admitting a large probe, and situated near the centre of the larger excavation.

The stomach contained upwards of two pints of dark semifluid blood, occasioning the distension perceived in the epigastrium. All the other viscera appeared healthy, and the remainder of both lungs was free from tubercles.

The portion of lung was exhibited a few hours after its removal to some of the members of the Pathological Society of Dublin. Among those I may mention Drs Graves, Stokes, and Corrigan; and to Mr Smith, one of the Secretaries, I am indebted for a beautiful preparation of the specimen.

Before concluding the history of the case, it may be well to remark, that the man had been under my care, two months before death, with a non-syphilitic bubo in the groin. He was in good general health, and resumed his duties immediately after he was discharged from the hospital. He had been fourteen months in the regiment, and had never been on the sick list more than a day or two at a time, and then always with the most trivial complaints.

There are several cases on record of tuberculous excavation without cough or expectoration. One has been related by Andral, (Clin. Med. Malad. de Poitr,) which I cannot forbear quoting. A young man, 18 years of age, came under his observation, with well-marked symptoms of chronic peritonitis and enteritis. On examination after death, the summit of the right lung was found hollowed out into a cavity capable of holding a small apple, the walls of which were lined with concrete purulent matter: this cavity was empty. Beside it there existed three or four smaller cavities communicating with each other, equally empty. The rest of the parenchyma of the lung contained a great many crude tubercles. The bronchial membrane was pale, accounting, Andral supposes, along with the empty state of the cavities, for the absence of cough and expectoration.

The rarity of fatal hemorrhage from rupture or perforation of a vessel in tuberculous excavation, has been remarked by almost every writer on the subject of tubercular phthisis, and though, on the whole, not uncommon, it is unquestionably, according to Latham (Clin. Lectures) one of the least frequent causes of hæmoptysis. Nature in these cases takes the greatest pains to prevent it, and, as observed by Dr Clark, (Tuber. Phthisis, Cyc. of Pr. Med.) the rarity of this accident may be estimated by the fact, that the bands which traverse the caverns were found by Louis to contain pervious blood-vessels in only 5 out of 123 subjects whom he examined. Andral, amid his extensive opportunities, has only once been able to find the orifice of the ruptured vessel from which the blood had escaped in hæmoptysis furnished by tuberculous excavation. This vessel was contained in a band which traversed the cavity, and which band had been torn. But in all the other cases he found it always impossible to trace the existence of the hemorrhage to the rupture of large blood-vessels.

In the case of Laidlaw, the vessel was larger than the temporal artery; it was distended with a firm clot, and was at first taken for one of the bronchial tubes opening upon the cavern, the whole of which were similarly plugged up. The interesting points of this case appear then to be;—

1. The existence of tuberculous excavations, without cough or expectoration, in a muscular subject apparently in the enjoyment of perfect health.
2. Under these circumstances suddenly fatal hemorrhage.
3. The discovery of the ruptured vessel and its size exceeding that of the temporal artery.

Richmond Barracks, Dublin, April 1839.

Art XI.—*Account of the Febrile and Eruptive Epidemics prevalent in the Island of Jamaica between* 1821 *and* 1832. By James Maxwell, Esq. Surgeon.

The month of March 1821 ushered in the measles, which prevailed epidemically, and became general over the island. The irregularity with which the disease advanced exhibited positive proof that a certain predisposition of the system was required before the rubeolous epidemy could affect it. The measles appeared upon many estates at first in a very limited form, seizing perhaps not more than half a dozen, when it disappeared for a few weeks, making other partial inroads, till its erratic tendency was laid aside; and then it became general amongst all ages, sexes, and constitutions susceptible of its impression.

Upon other plantations its advances were more regular, and in the course of a few days fifty, eighty, or upwards were affected with the epidemic on one property. It was preceded by a mild fever, and accompanied with catarrhal symptoms, considerable tumefaction of the face, slight inflammation of the eyes, hoarseness, cough, destillation from the nostrils, and, on the fourth or fifth day, stigmatized dots appeared, which soon coalesced into small crescent-shaped clusters, and the disease terminated favourably by diarrhœa.

This mild form of measles continued for a considerable time;

but as the season advanced, and the temperature of the atmosphere increased, the character of the epidemic changed, and assumed that fatal type which caused such a lamentable mortality among the negro population. As the disease advanced, the pyrexial symptoms became more and more severe, and instead of a slight catarrh that prevailed at the opening of the epidemic, concomitant symptoms of bronchitis and pleuritis supervened, and in some estates dysentery of a most appalling form usurped the place of the critical diarrhœa, sweeping off with awful rapidity men, women, and children.

Upon one plantation in the mountainous district of St George, a very simple incident had an immediate effect in changing the character of the disease, and exhibits in a forcible light the danger of atmospherical vicissitudes during certain states of the body, and under the administration of particular medicines.

The disease was advancing very favourably as *rubeola vulgaris*, and several had been dismissed cured; seventy patients still remained in the hospital and out-houses, who were treated by gentle laxatives and diaphoretics. I visited the property very early one morning during a cold, bleak, continued drizzle, and to my surprise, and contrary to express instructions, found that the patients had been ordered from their respective apartments into the damp air, that their medicines might be more conveniently administered. The consequence was, that most of them got partially wet and chilled, and next day the catarrhal symptoms became so severe as to assume very generally an urgent form of pulmonic inflammation, and the simple diarrhœa merged into dysentery. These accompanying affections were easily subdued by the energetic use of the lancet in those whose constitutions had been previously unimpaired; but amongst cachectics, dirt-eaters, and persons with yaws, a consecutive dysentery supervened, and proved fatal to one-fourth of the patients.*

This was the only coffee plantation in the densely populated mountainous district of Buff Bay River that suffered so severely. On some of the adjoining properties, although the disease was general, it possessed a mild character, and the dysenteric symptoms which succeeded the decline of the eruption yielded to the usual treatment, and out of three hundred patients only one fell a victim to gangrene of the lips as a secondary affection.

Upon an estate in the lowlands, with a population of 600 negroes, the measles prevailed so generally, that the work of the plantation was considerably retarded. After it had been endemial for a few weeks, and the eruption began to decline, it assumed an alarming aspect from the supervention of dysentery; the most rigid attention was paid to cleanliness and ventilation, and the capacious mansion-house and out-offices were thrown open for the reception of those who could not be accommodated in the hospital, and the disease passed off without a fatal case. On some estates in the neighbouring parishes, the dysentery that followed in the train of the epidemic proved much more fatal than with us, and few of them escaped without considerable loss.

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* The cold affusion has been occasionally used during the eruption of measles; but there is a wide difference where the patient is stripped, and momentarily subjected to the application of cold water, and then put to bed, and where he is allowed to remain in his wet clothes till chilled into the cold stage of fever.

In strong robust habits, when inflammatory symptoms of the lungs appeared, venesection was indispensable, and many marked cases of dysentery, attended with pyrexia, bounding pulse, abdominal tenderness, and mucous bloody stools, were advantageously treated by copious blood-letting, calomel, opium, and blisters. Aphthous eruptions appeared as the sequelæ of measles, affecting the inside of the lips and tongue in some, and in others extending to the throat, producing partial ulceration, and vanishing as the constitution rallied. These appearances were treated with bark, mineral acids, and a generous diet.

Cachectics not only suffered severely during the eruptive stage, but also from the consecutive effects of the disease under the form of dropsy and chronic dysentery, which proved fatal to many of that class. Children with yaws experienced no immunity from measles; and it was a curious coincidence to observe two distinct eruptions existing in the system at the same time; the yaws, it is true, gradually yielded to the prevailing epidemic; but no sooner did the latter disease run its course, than the former generally reoccupied their station.

In a few cases, where the susceptibility of the system for yaws had been nearly destroyed, they never returned; and, under similar circumstances in debilitated constitutions, the patients also sunk; but from the repulsion of the disease, were superinduced many anomalous symptoms, which finally terminated in anasarca, dropsy, or dysentery. Gangrene, as a secondary affection, both in the cheeks and lips, was observed in a few cases connected with an exhausted state of the system; and ophthalmia was another sequence of the disease, which appeared on the decline of the eruption, and continued for a few days.

The rubeolous epidemic, after having expended its primary virulence, continued in this parish for twelve months, revisiting those plantations where its partial attacks left others exposed, and few persons who never had the disease escaped the general epidemy.

Catarrhus Epidemicus.—I have never observed influenza in any other shape than that of a modified epidemical catarrh. Those awful visitations of influenza which traversed the greatest part of the globe in 1781 and 1782, originating in China, spreading through Asia and Europe, and extending to America, as well as its recent appearance in Great Britain, are fortunately rare occurrences, and equally fortunate is it for the population of this island that its pestilential form is seldom seen. The influenza of 1823, which appeared in the middle of September, was perhaps as general an epidemic as could be witnessed, but its extreme mildness scarcely attracted more notice than a simple catarrhal affection. The atmosphere during the day-time was still sultry and oppressive, and the nights were chilly and cold, with frequent flying showers, producing rapid aerial transitions, highly conducive to the propagation of the disease. Its invasion was rapid, commencing with a quick full pulse, headach, fulness of the eyes, discharge from the nostrils, and slight pain of the chest. As the season advanced towards the end of November, heavy rains, with sultry southerly winds, prevailed, and the disease became more aggravated. The pulmonary symptoms were more severe at this period, the headach and constriction across the temples became violent, and was accompanied with smart fever. In a few cases the lancet had to be used, but the disease generally yielded to saline purges, with the free use of antimony, and in December it disappeared altogether.

On the 20th of May 1824, it again appeared in a mild form, the weather had been dry, and the periodical rains up to this time had not set in. The air was hazy and sultry, and the thermometer generally stood at 75° in the morning, 90° in the middle of the day, and 82° in the evening. Its introduction was sudden, attended with headach, heaviness across the eyes, discharge from the nostrils, foul white tongue, dry constricted skin, febrile symptoms, acute pain of the side and cough. The pulse ranged from 110 to 120. This disease was occasionally seen in the intermediate periods between 1824 and 1836, but generally so mild as only to require the simplest treatment. In November 1829, it commenced as a smart epidemic, and soon became generally prevalent. The symptoms were pain of the neck, head, and chest, difficult hurried respiration, short cough, dry hot skin, watering of the eyes and nose, with a foul, white, moist tongue. In a few instances the tonsils were inflamed and swollen, with difficult deglutition, loss of appetite, thirst, and quick pulse. Diarrhœa was a concomitant with some. Blood drawn the first and second day exhibited the buffy-coat; after this period extreme exhaustion and a tendency to syncope succeeded, the vital powers became unusually prostrated, and the patient frequently fainted upon the least motion. A free perspiration, with soft cough, indicated recovery; hurried respiration, confused tumultous pulse, with urgent pyrexia and delirium, were the forerunners of death. In some cases it proved fatal in twenty-four hours, and cachectics and weakly people suffered severely. Those who were principally affected with this epidemic were strong robust young people, apparently able to bear venesection; but after the first or second bleeding the fearfully exhausted state of the patient (which had a striking similarity to some of the peculiar stages of congestive fever), demanded a cautious line of conduct, and the adoption of a different mode of treatment to what is generally required in influenza. The following mode of treatment was successfully pursued in this peculiar epidemic.

When a young plethoric person presented labouring under acute pain of the side, intense headach, laborious breathing, short irritating cough, and quick strong pulse, blood was rapidly abstracted till the lungs were completely relieved; the bowels were evacuated by a full dose of calomel, followed by small quantities of a solution of salts and tartar emetic, so as to excite and keep up nausea; the chest was fomented and blistered; steam was inhaled into the lungs; and occasional doses of camphor, ammonia, and James' powder given as a sudorific. The feet-bath was frequently used, bottles were applied to the sides and extremities, and the throat and jaws were wrapt up in flannel. The moment a diminution of animal heat was observed, and the skin became cold and clammy, with extreme anxiety and increased pulmonary disturbance, more resembling suffocation than acute pain, reaction and an equable diffusion of the circulation were generally restored by giving occasionally a cup of hot arrow-root, with brandy, administering turpentine enemas, and using frictions and local stimulants. So sudden was the invasion of influenza in 1829, that some people were conscious of the attack on getting from bed and going out of doors. During the prevalence of this epidemic, the atmosphere was heated and loaded with moisture during the day, and the nights were cold and chilly.*

Epidemic Febrile Rheumatism accompanied with a Roseolous eruption.—This anomalous affection, on its first appearance in 1827, was thought to have been introduced from St Thomas's, where it prevailed as a general epidemic; but as it appeared nearly simultaneously throughout the West India Islands, there is reason to believe that it was propagated through the medium of the atmosphere. Its appearance in Kingston was instantly recognized to be the same disease which was described in the newspapers as raging in the Virgin Islands, and called by the inhabitants Dandy Fever, a term which, although somewhat ridiculous, was, for want of one more expressive, immediately adopted here.

The rapid manner in which this singular and, as far as I know, non-descript* disease spread, first throughout the white and coloured population, and subsequently amongst the blacks, together with its anomalous character, became, as may be supposed, exceedingly interesting to medical observers, and excited no small degree of consternation in such a densely populated city as Kingston.

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* The peculiar termination of many cases of influenza during this epidemic in collapse, required the most powerful stimulants to excite the *vis vitæ*, and there is no better or more powerfully diffusive stimulus than brandy. I have seen patients in congestive fever, and apparently in *articulo mortis*, frequently snatched from the jaws of death by the judicious use of hot brandy toddy.

The panic which invariably accompanies the introduction of a strange epidemic was in this instance at first very considerable, and its fame scarcely spread over the island with more rapidity than the disease itself, but it was soon pronounced to be unattended with danger, and confidence was again restored. There probably never was a more general epidemic than this, nor one attended with less dangerous consequences. Almost the whole white and coloured population were sooner or later affected, and very few remained who were not personally acquainted with the dandy fever. The negroes were later in being affected, and it was by no means so prevâlent amongst them as the former.

If any arrangement were allowable with this disease, which has diverged from the regular path of nosology, it would be to divide it into the eruptive fever, the rheumatic affection of the muscles and articulations, the periods of efflorescence and of desquamation, and the secondary effects of the disease. These were the more usual order of succession in the symptoms; but they were occasionally deviated from, and some were so instantaneously affected with a painful spastic rigidity of the muscles from the crown of the head to the sole of the feet, that it resembled more an electric stroke than the invasion of a simple epidemic.

The disease generally approached by slight alternations of heat and cold, loss of appetite, foul tongue, headach, nausea, and vomiting, accompanied with a peculiar soreness and stiffness of the muscles, smart and sometimes intolerable pain darted through the back and extended to the extremities, and the patient became so rigid and inflexible that it required some time to sit down or rise up. The febrile attacks with some were slight, while others had severe accessions, with bilious vomiting, bounding pulse, acute headach and constriction across the temples, with pain and suffusion of the eyes. The continuance of these symptoms varied from a few hours to a couple of days, terminating in perspiration, and leaving the patient in a helpless and painful state of inflexibility.

On the second, but more frequently on the third day, an exanthematous efflorescence of a roseate hue spread over the body, occasionally so diversified in the deepness of its shade as to resemble scarlatina, and in a few instances the rose-coloured suffusion was even stigmatized with papuliform groups, not unlike *lichen tropicus.*

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* At the time these notes were written I had not seen Dr Stedman's excellent description of this disease, in the 30th volume of the Edinburgh Medical and Surgical Journal.

In the generality of cases, the efflorescence was neither so diffuse nor so continuous as scarlatina, or so evanescent as the wheals of nettle-rash, but bore a striking similitude to *roseola æstiva.* The joints, which were before only painful and rigid, now became swollen, more especially those of the ankles, knees, and wrists, and a smile could scarcely be repressed at the ridiculous attitudes in which the strongest persons were placed. Many who heartily despised the very name of dandy, were compelled for days to mimic the formal unbending position of that contemptible genus, and some did not recover their former elasticity for months. The fingers were surrounded with a faint reddish blush, and so stiffened and painfully enlarged at their articulations, that in some cases it was impossible to draw on a glove or shut the hand. The tongue and inside of the mouth were in many instances blistered and excoriated, and the throat was occasionally inflamed and tumefied, and accompanied with difficulty of swallowing.

Many anomalous and curious sensations were experienced; some were affected with intolerable formication, others temporarily lost the sense of taste or smell or touch ; and it was by no means an unusual thing for patients to complain, that they felt as if they had lost part of their hands or feet, or that the points of the fingers and toes were awanting.

About the fifth day the eruption began to desquamate, and in a few days more the rheumatic affection disappeared. In some persons secondary pains succeeded to this order of symptoms almost immediately after the first attack ; but generally a few weeks elapsed before lumbago or chronic rheumatism of the large joints supervened, and in elderly people they were very severe, and continued for twelve months and upwards. The epidemic proved most obstinate to old people ; a few were rendered disabled, and some died from its effects.

Infants were very generally affected, and in one case the little patient was so inflexibly rigid, that its mother expressed fear " lest it should break" in lifting. The nature of this communication will not allow me to detail cases ; I shall therefore satisfy myself by describing the manner in which it attacked my own person, as an illustration of the modified and most common form of the disease.

June 5, 1828.—I have been in daily intercourse with patients affected with the dandy fever for months, and never experienced the slightest symptom till to-day.

After visiting a person labouring under remittent fever, I rode along the western side of a hill on a very hot day, about 2 P. M., when I was instantaneously seized with intense pain of the head, with a sense of fulness and tightness over the whole brain, and was for a moment so overcome, that I thought I had received a stroke of the sun. A few minutes afterwards, my stomach became uneasy and nauseated, and from that moment I experienced a hebetude and indescribable stiffness. Towards evening, slight chills preceded a moderate accession of fever, which continued a few hours, and ended in perspiration. Next morning the stiffness increased, and I was compelled to take to bed. On the third day, an universal eruption appeared over my body, of a rose colour. My joints now became more particularly affected, not so much with pain, as with a peculiar feeling of ankylosis, and a sensation as if my heels were awanting. The fingers at this time suddenly swelled, were very painful, numb at their points, of a reddish hue, and left white marks when pressed. The fourth day, I was slightly feverish; the pulse 100; I had no appetite; great pain of back, and stiffness over the body. My case is not of that severe description which prevents me from attending to my business. I have twice taken to bed, and have as often been roused and called to visit others, which, upon the whole, has been in my favour. The fifth day, the eruption began to decide and scale off; the joints are still very stiff, and sensation begins to return into my heels. From this time the disease gradually left me.

Epidemic febrile rheumatism prevailed nearly twelve months through a variety of seasons, and was neither perceptibly influenced by vernal nor autumnal equinoxes, by our strong wintery north wind, nor by the scorching fiery sea breezes of June and July. Upon its first appearance in Kingston, it prevailed in a very general state, and was asserted to be positively contagious. The presumptive circumstances which favoured this opinion were; 1*st*, That several of the jurors from the northern parishes who went to attend the Surry assizes, as well as persons trafficking to the south side, were immediately attacked on their arrival in Kingston; 2*d*, That on its appearance on the north side of the island, it was occasionally communicated as it were from one member of a family to another, till every individual was affected; and 3*d*, That it prevailed more extensively in some places than in others, and that the population of some plantations were generally affected, while others in the vicinity were exempted. Upon a superficial view of these occurrences, we might be inclined to favour the opinion of the contagious nature of the disease, till we look upon the converse state of things; and 1*st*, Had the disease been contagious it must necessarily have taken up a considerable time before it could be generally propagated, whereas it was almost simultaneously diffused throughout the greater part of the island; 2*d*, Its appearance was partial in certain districts, affecting a few individuals of a family or of a plantation, while the remainder escaped; 3*d*, Its having occurred in places secluded from all communication.

From premises apparently so contradictory, there is some difficulty in drawing an inference. We may reasonably conclude, however, that certain meteorological states of the atmosphere existed favourable for the propagation of the epidemic, as well as a certain predisposition of the system to receive the infection. Measles and small-pox can palpably be traced from patient to patient, and from house to house, aided also by atmospherical peculiarities favourable to their rapid transmission; but those diseases which pervade extensive portions of the globe and travel with the rapidity of the wind, such as influenza, yellow-fever, and this anomalous form of febrile rheumatism, must be considered as depending altogether upon aërial causes, and not upon actual contagion.

The treatment of this disease was extremely simple; few required any other medicines than a saline aperient with an antimonial opiate, or a few grains of Dover's powder. Venesection was used in a few cases where local determinations indicated, and the consecutive symptoms were treated as chronic cases of rheumatism.

Variolous Epidemic.—In 1831, the small-pox made its appearance first in Kingston, and shortly afterwards spread over the island.

Its ravages were confined within restricted limits by the very general use of vaccination, and the most sceptical had frequent opportunities of becoming converts to the efficacy of cow-pox, by observing the pestilence visiting the unprotected inmates of families with unerring fatality; while those who had been subjected to careful vaccination, not only remained amidst the fomites of the disease, but handled and assisted the infected with impunity.

A few fatal cases occurred amongst those who had been vaccinated during the acme of the epidemic, but a greater number of well authenticated cases proved fatal to those who were considered beyond the sphere of the disease by having had small-pox in their infancy. A few failures occurring in an extensive and general epidemic, can neither invalidate the conclusions relative to the efficacy of vaccination, nor to a logical mind will they have the least effect in impugning the mass of evidence in favour of the Jennerian discovery. Such irregularities are the freaks of nature, which, like exceptions to general rules, become useful, inasmuch as they direct our minds to the causes of failure; and if we are not permitted to lift aside the veil, our labours are often rewarded with a more intimate acquaintance with the disease.*

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* The general tendency of yaws, which is one of the most obstinate and disgusting of specific eruptions, is to occur but once during life; but those who are intimately acquainted with the disease must have had repeated opportunities of observing its recurrence in the same person two or three, or even four times, and in some rare cases renewing its cycloid visits at short intervals during the lifetime of the patient.

The protective influence of vaccination was confidently relied on at the time the epidemic appeared, and the most superstitious of the negroes were readily induced to subject their children to the operation. It is much to be regretted, however, that an operation, the proper performance of which involved such consequences, should not have been left entirely to the regular practitioner. This was not the case; for many persons, ignorant of the discriminative character of the genuine vaccine vesicle, were to be seen performing a fictitious operation, and inserting spurious matter. A non-professional friend of mine was busily engaged, while I visited him one day, in inoculating a great number of negro children from what he considered to be a perfect case of cow-pox taken from the arm of a child affected with a pustular eruption. I have reason to believe that many were operated upon under similar circumstances, and the consequence was, that a spurious pock was propagated from matter widely disseminated, possessing the following diagnostic characters.

A pustule instead of a vesicle, not depressed in the centre, containing purulent matter from the beginning, and when punctured the entire contents escaped; not cellulose, no areola, and its inflamed base extended no more than two or three lines beyond the pustule. It began to dry about the seventh or eighth day, leaving no cellulated or dotted marks. A subject involving such vital importance as the protection of a densely populated island, from the ravages of small-pox, rendered doubly malignant from the heat of a tropical climate, ought to claim the serious attention of a wise Legislature; and it is to be regretted that our vaccine establishment has been abolished from mistaken motives of economy. Since that period it is difficult to procure lymph, and the supply brought by the London ships rarely proves effectual, in consequence of some unknown decomposition which it undergoes.

On the first appearance of small-pox here, it was raging amongst the neighbouring islands, and was generally believed to have been imported from St Thomas's or Nassau. As the lymph in use was not considered to be genuine, a ship of war was dispatched to the Havanna for a supply, when an unexpected source opened, from which the whole country was eventually supplied. A most benevolent Spanish lady was in the habit of preserving lymph, and, with a rare disinterestedness, not only distributed matter, but vaccinated her poor neighbours gratuitously. In Kingston, when the disease first appeared, it raged with considerable fury, and soon assumed a malignant form. From this centre of contagion, it gradually extended over the island.

The first fatal case in this parish happened under circumstances so peculiar, that I shall transcribe it at length from my note-book. A healthy boy, aged 9 years, had been vaccinated by myself seven years previous, from the arm of a child with a perfect vaccine vesicle. I attended minutely to the progress of the eruption, and was satisfied, both from the constitutional irritation and appearance of the vesicle, that it possessed all the genuine characteristics of the Jennerian cow-pox.

This boy and another of the same age were at school in Kingston, and boarded in a house where small-pox appeared in the natural way in a person not vaccinated. One of the boys had never been vaccinated, and the operation was performed at this time by a professional person. They were both brought to the country as a matter of mere precaution, when the boy whom I vaccinated, and on whose arm were satisfactory cellulated dotted cicatrices, sickened exactly a week afterwards.

14th June, The febrile symptoms are smart, with severe lumbar pain, and wandering pains of the limbs; the eyes are slightly inflamed.

15th, 16th, A minute efflorescence observed on the forehead and hands, the pain of back is excruciating, shooting along the spine towards the head; eyes inflamed, tongue furred, quick pulse, thirst, and hot dry skin.

18th, The efflorescence assumes a rough appearance followed by numerous papulæ, thickest about the face and back, which were rapidly developed during the day, interspersed with petechial stigmata of a black and indigo-blue colour, more particularly about the legs. The pain of the back is very severe, the face generally swollen, with tumefied eyelids, and the eyes appear as if minutely injected; constitutional derangement is great.

19th, The forehead and face are covered with innumerable small papulæ with acuminated apices, each surrounded by an inflammatory blush, which gives a dull reddish appearance to the countenance, and when examined through a magnifying glass, they appear transparent, and have individually a minute brownish stigma on the point. The petechiæ have increased in number and size, and some of them are as large in circumference as garden peas, and when the finger is run over them they feel hard and tuberculous. The tonsils and fauces are slightly inflamed, the tongue covered with a brownish fur, the eyes are suffused, the face enormously swollen, the febrile symptoms assume more of a typhoid type, and the stools are mucous and bloody.

20th, The eruption is confluent, of a dark-brown colour, and filled with lymph; the dotted appearance on the points blackish-brown. During the day the eruption became more flaccid, with a tendency to strike in. The dysenteric stools were mixed with blood and very fœtid; delirium was urgent with the pulse at 120, small and weak; the throat was inflamed and swollen; and a deep purple spot was observed on the side of the tongue. Towards evening the eruption assumed a dark lurid appearance, and the purple petechiæ increased in size. He continued from this to sink, and died next morning.

I have by me the history of another case similar to that related, where a youth of 12 years of age was vaccinated a few months before by a medical man, who was satisfied that the process was complete, and who had perfect cellulated marks on his arm. The disease was raging in the natural way on the plantation, where the boy had free communication with the infected, and where several fatal cases occurred amongst the unprotected. He was attacked with confluent small-pox of the most malignant kind, and died on the ninth day. These two fatal cases, where the patients were considered as placed beyond the sphere of the epidemic from the genuine character of the cow-pox, created a certain distrust in the minds of some, relative to the protective influence of vaccination; but their failure was more than counterbalanced by several well attested cases of persons, who had the small-pox in their infancy falling victims to a secondary attack of the same disease.

A female of colour, who had variola in infancy, and whose deeply indented surface bore evidence of the acute nature of the primary complaint, caught the disease at the height of the epidemic, and fell a victim to the worst form of confluent small-pox. These deviations from the ordinary course of nature can no more be accounted for, than persons whose peculiarities of constitution enable them to resist the contagion of the plague, syphilis, and yaws; and their occurrence is so exceedingly rare that they may be looked upon as solitary exceptions to established laws. On several plantations where vaccination had been generally resorted to, sporadic cases of natural small-pox selected those who were not protected, and, in many instances, proved fatal. The perfect impunity with which protected children associated with aggravated cases of the variolous disease, did more to silence the objections and remove the prepossessions of an ignorant peasantry, than all the arguments that could be adduced. A plantation with sixty negroes afforded a lamentable proof of that want of precaution which is but too often seen, and which might have been effectually obviated by a very little trouble and expense. An infected individual from Port Royal mountains communicated the contagion to one of the women, who died of confluent small-pox, but not before she bequeathed it to three men who were unprotected, and all of whom died of the worst form of the disease. The few who had been vaccinated escaped, and, as there was no cow-pox matter ready, the remainder were inoculated, and passed through the disease in a very mild form. They evinced considerable reluctance to the operation, till the overseer, who had been vaccinated in infancy, and who had satisfactory cicatrices, inserted matter into his own arm without its being followed by any eruption. However mild the disease was in this instance, the like happy exemption was not uniformly observed elsewhere, as frequent fatal cases occurred from inoculation during the prevalence of the epidemic. While the disease was in its plenitude, a few reported failures of the protective influence of vaccination were exaggerated, and several managers of properties and heads of families, in their anxiety to ward off the prevailing distemper, had recourse to inoculation, shortly after the introduction of the vaccine matter, as an additional security.

If, as has been suggested with some degree of probability, the susceptibility of the system to resist variolous contagion is lessened or becomes altogether destroyed after a certain lapse of time, it will become an object of paramount importance to render the constitution secure against those fatal forms of small-pox which have lately appeared after cow-pox, either by revaccinating or by inserting variolous matter on the decline of the vaccine disease. The latter process is so simple, and safe, and complete, that we would have a double security in guarding the system from the unexpected and distressing occurrences which occasionally produce so much consternation. Let it not be understood, however, that, in the present state of uncertainty, where only very slender doubts are entertained of the lasting antivariolous powers of cow-pox, I am advocating a doctrine which is at variance with the opinion of the most enlightened and humane of the faculty; far from it; but as occasional failures have taken place under our immediate notice, it becomes our duty to watch carefully, and faithfully to report, every circumstance so vitally affecting the welfare of the community. I cannot place the value of the Jennerian discovery in a clearer light than by selecting the following condensed cases from many others in my possession, where, from circumstances over which I had no control at the moment, the patients were inoculated with small-pox, having been vaccinated a few weeks before by myself. Having attended minutely to the whole process, I consider it (if any thing were wanting to strengthen our faith in the discovery,) as a sort of *experimentum crucis*, which establishes in the most triumphant manner the perfect control which cow-pox has over small-pox, and leads us not without reason to expect that the variolous disease, like a few others, will in time be exterminated.

On C. V. plantation thirty-six children were inoculated from the arm of a person who had small-pox in the natural way and who recovered.

The same children had been vaccinated by myself a few weeks previous, had the genuine vaccine vesicle, which left distinct cellulated marks on the arm.

Thirty-three of these children, submitted to inoculation, had no eruption, most of their arms drying up, and only a few had slight topical inflammation on the arm where small-pox matter was inserted.

One had a few pustules about the mouth and arm-pit, with a slightly inflamed arm, and febrile symptoms.

One had about thirty pustules.

One, on whom vaccination failed, had about 100 pustules on different parts of the body, with febrile symptoms.

A child on this plantation was inoculated with small-pox without submitting to cow-pox; the variolous disease became confluent, with inflamed throat, and proved fatal. Another under similar circumstances had a general eruption of small-pox.

The following ten cases, members and servants of a family from six years to twenty years of age, were vaccinated by me in May, with lymph taken from a perfect specimen of cow-pox. They all had the vaccine disease in as genuine a form as I ever saw it, with slight constitutional symptoms. Two months afterwards the whole of them were inoculated with matter taken from a person labouring under natural small-pox.

1. W. S. Vaccinated in May; the vesicles on the arm were distinct, contained lymph from the beginning, and left cellulated marks.

Inoculated 2d July; a week afterwards was seized with slight febrile symptoms, and four days from this period the eruption appeared general over the face, body, and extremities; the pustules were slightly indented on their apices, with inflamed bases; the tumefaction of the face just perceptible, throat sore, with difficulty of swallowing, and on examination four distinct pustules were observed on the back part of the fauces, and three on the tonsils and uvula, all surrounded by a slight blush of inflammation. The disease was mild, and he was never confined.

2. E. S. Vaccinated in May; cellulated indented cicatrices on the arm. Inoculated on the 2d July with small-pox; seven days afterwards he was affected with slight febrile symptoms, and three days more the eruption appeared. The pustules were round, contained pus, chiefly on the face; in all about three dozen. The throat was slightly inflamed; three pustules occupied the tonsils. He was not confined.

3. G. S. Vaccinated in May. Cellulated marks on the arm. Inoculated 2d July with small-pox; on the eighth day febrile symptoms succeeded, and three days afterwards the eruption appeared like flea-bites; four days more the pustules were formed. No fever since the eruption appeared. The arm is ulcerated where the matter was inserted; pustules depressed in the centre; seven on the face and twenty on the body. Slight inflammation of the throat; three pustules on the fauces. He was not confined.

4. W. R. Vaccinated in May; cicatrices in the arm satisfac-

tory. Inoculated 2d July with small-pox; eight days afterwards one pustule appeared, besides the one on the arm.

5. M. N. Vaccinated in May. Cicatrices satisfactory. Inoculated 2d July with small-pox. After a slight febrile accession, one pustule appeared.

6. C. Vaccinated in May. Cicatrices satisfactory. Inoculated 2d July with small-pox. No eruption followed.

7. M. S. Vaccinated in May. Cicatrices satisfactory. Inoculated in July. *Not taken.*

8. C. S. Vaccinated in May. Cellulated marks on the arm. Inoculated in July. *Not taken.*

9. A. S. Vaccinated in May. Satisfactory cicatrices. Inoculated in July. *Not taken.*

10. Vaccinated in May. Satisfactory cicatrices. Inoculated in July. Four pustules.

Two of the cases out of the thirty-six children inoculated may be regarded as specimens of modified small-pox, and five, but more particularly three, out of the ten cases also assumed the distinctive character of that subdued form of the disease. On the adjoining property to the one where the thirty-six children were vaccinated and inoculated, the disease appeared as natural small-pox in Rosetta, who on 25th Oct. complained of febrile symptoms, pains of the loins and extremities, and on the 29th at 8 A. M., the eruption was perceived as minute flea-bites. On 30th, it was coherent, and on November 2d, confluent, with tumefaction of the face, swelling of the eyelids, inflamed eyes, ulcerated mouth and throat, and strong febrile symptoms. On 7th, the pustules were at their height, and she died on the 12th. Four out of five adults who took the disease in the natural way died of confluent small-pox. Thirty cases (twenty-two of which had been previously vaccinated,) were inoculated from Rosetta, but showed no symptoms of the disease, and eight unvaccinated went through inoculated small-pox in a very mild way. On H. plantation, forty-four persons were inoculated with small-pox matter, none of whom had ever been vaccinated; thirty-eight passed through the disease in a mild form; three had it very severe; two had them confluent, and recovered with great difficulty; and one fell a victim to confluent small-pox. Similar results happened in many parts of this parish; and although the mortality from the disease was great, only two well authenticated cases where vaccination had been satisfactorily performed proved fatal. Such results cannot fail to strengthen our confidence in the protective influence of cow-pox; and the public ought to be reminded that, from the recent change which has taken place in colonial affairs, should small-pox unfortunately appear again before vaccination has been generally resorted to, the consequences will be lamentable.*

In the course of this epidemic frequent opportunities were observed of verifying the truth of the Hunterian axiom, "that different diseased actions in the whole constitution or in part of it, suppress and destroy one another, that is, the weaker action gives way to the stronger." This was particularly seen in the very general epidemic of measles in 1821, where yaws in certain cases was suppressed, and where the susceptibility for the disease was almost destroyed, it never returned. The same occurrence was observed during the prevalence of small-pox, the yaws in most instances receded, and in some did not return, but whether in these cases the virus had been completely destroyed so as to secure the patient ever afterwards against the secondary attack of yaws, or from the still more lamentable consequences of the constitutional effects of that malady, time alone will show.

Chicken-pox has been observed in this parish almost as an annual visitant from the time of my arrival in the island, appearing sporadically, and at times assuming the form of an epidemic. It co-existed with small-pox, and was prevalent in the town of Annotto Bay, before that disease was introduced into the island. It may be deemed unnecessary to notice a disease so simple, and so generally unattended with danger, as chicken-pox; but as its appearance has occasionally excited suspicion, and upon more than one occasion, no small degree of alarm, when there was not a case of small-pox in the island, nor had been for many years, and as it has received additional consequence from that minute observer, and distinguished pathologist, Professor Thomson of Edinburgh, maintaining in his hypothesis, that small-pox, chicken-pox, and modified small-pox, all proceed from one and the same contagion, a brief notice of its nature and eccentric visitations may not be uninteresting.

In 1824, I first observed chicken-pox appear very general throughout the parish, and in Annotto Bay. At this time vaccination had been rigidly adopted upon most plantations, but many of the poorer free classes neglected it. Many affected with varicella had never been vaccinated, and the character of the disease was similar in those vaccinated and those not. It appeared as a distinctly vesicular eruption, at first like millet-seeds placed upon a slightly inflamed base, irregularly circular, which increased and varied from the size of a pin-head to a small split-pea; the vesicles were transparent, and easily ruptured by drawing the finger over them. The eruption was thickest upon the face, chest, and arms; was ushered in by a slight fever in some, while others had no constitutional derangement, and terminated about the fifth day.

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* Some means ought to be devised to protect 80,000 emancipated children, not one of whom, it is presumed, has been vaccinated, besides the juvenile population of the poorer classes. The former have been generally withdrawn from medical care and attendance, and being placed beyond the salutary surveillance of their former masters, and abandoned to idleness and sloth, the occurrence of small-pox at this time would prove an exterminating visitant.

In 1829, it again appeared as an epidemic, attacking equally those not vaccinated and those who had been, and the small-pox was not then in the island, nor had been for many years. In 1831, it again appeared contemporaneously with small-pox, but in a limited form; and I had an opportunity of seeing cases of *varicella lenticularis* and *globosa* a very short time previous to the introduction of the variolous epidemic into the island. The chicken-pox, both previous to and during the prevalence of small-pox, occurred in a vesicular form of different sizes, the apices of which were indented and marked with blackish stigmata; they were easily ruptured, and contained a straw-coloured lymph. The vesicles did not appear simultaneously, but were observed to form at different times, drying up about the fifth day, leaving in a few instances indented marks on the skin. One or two cases of confluent varicella appeared, with slight tumefaction of the face, and smart fever. In this as formerly, the chicken-pox seized those who had been vaccinated, and those who had not been submitted to that operation.

Between this period and 1834–5, its skirmishes were desultory; when it again appeared in the form of an epidemic more general than I had ever observed it before. Small-pox had disappeared from the island since 1831. Varicella, at this time, 1834–5, was ushered in by febrile symptoms of two or three days duration, when a vesicular transparent eruption was observed first upon the face, arms, and trunk, which became more and more opaque, till purulent matter was formed; each vesicle had a dot on its apex of a brownish colour, and about the fifth day they declined, leaving slight discoloration of the cuticle;* and a few were as distinctly marked as if they had gone through small-pox. It attacked those not vaccinated as well as those who had been, and appeared in insulated places amongst persons who could by no possibility have had communication with the infected. In no instance did it prove fatal. The occasional appearance of sporadic cases of chicken-pox, as well as its prevalence as an epidemic in 1824, 1829, 1834–5, at periods when small-pox had not been in the island for many years, and its attacking those who never had cow-pox or small-pox, equally, and in the same manner with those who had gone through these diseases, show, in the most unequivocal manner, that the contagion of chicken-pox and small-pox, are essentially distinct, and have no common origin.

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* On the negro skin.

PART II.

CRITICAL ANALYSIS.

Art. I.—*Experiments and Observations on the Gastric Juice and the Physiology of Digestion.* By William Beaumont, M. D., Surgeon in the United States Army. Reprinted from the Plattsburgh Edition, with Notes, by Andrew Combe, M. D., Fellow of the Royal College of Physicians, Edinburgh. Edinburgh, 1838. 12mo. Pp. 319.

In order to ascertain the nature of the changes effected on the food in digestion within the stomach, and the nature of those agents by which they are effected, various methods have been adopted by different physiological inquirers. Reaumur, the first who studied digestion experimentally, endeavoured to ascertain the nature of these changes by introducing within the gizzards and stomachs of fowls and birds of prey, and the stomachs of various granivorous and carnivorous animals, tin tubes, open at each end, containing various edible grains and other alimentary substances. Spallanzani, while he repeated this method of experimenting, tried also the effect of placing alimentary articles in similar circumstances without the stomach to those in which they were placed within the cavity of that organ.

Another mode of obtaining information on this subject was to repeat and to modify the experiments of Reaumur, by conveying into the stomachs of animals hollow spheres or tubes of metal, perforated so as to admit the entrance of any fluid agent, to combine with this method experiments in which alimentary articles were placed without the stomach, in similar circumstances to those in which they were situate within the stomach, or to subject them to what was called Artificial Digestion, and finally to examine alimentary articles from time to time during the process of digestion in the stomachs of living animals and men. This, which was the method pursued by Spallanzani, was the most complete in principle and speculation, but necessarily very imperfect in performance, in so far as it must be always difficult in such circumstances to procure gastric fluid quite pure, and a certain degree of doubt must attend the examination of all articles of food extracted from the stomach after the commencement of digestion, either by mechanical contrivances or by means of vomiting. By this method of inquiry, however, Spallanzani ascertained the following facts. 1. Digestion in the musculo-membranaceous stomach, like that of man, the dog, and similar animals, is accomplished chiefly by a species of solution, by means of a fluid secreted from the villous surface of the stomach. 2. In order, however, that this solution begin, and be carried on in an effectual manner, it is requisite that the grains or other articles subjected to digestion be previously bruised, or broken, or softened by trituration or mechanical division. 3. The fluid secreted by the inner surface of the stomach is an antiseptic, and checks incipient putrefaction. 4. The early stage of digestion is attended with marks of acid reaction in the alimentary pulp, which, however, disappears towards the close of the process.

As a third method of investigation may be mentioned, that employed by Dr Stevens, and described by him in his Inaugural Dissertation published at Edinburgh in 1777. Of the general nature and results of these experiments an account was given in the seventeenth volume of this Journal (p. 574—579), to which we beg to refer the reader. He found, that all alimentary substances subjected in this manner to the power of the stomach were acted upon in a remarkable manner, though the changes induced varied in degree. In general, raw animal matters suffered less than those which were roasted or boiled; roasted or boiled animal matters, which had been mechanically divided, were most completely dissolved; next to these the substances which were inclosed within spheres, with large holes were, *cæteris paribus*, more thoroughly dissolved than those contained within spheres with minute perforations; the various vegetable grains, as wheat, rye, barley, oats, and peas were least of all altered, having only become moistened and swollen; while bone underwent no perceptible change from the agency of the human gastric fluid; and lastly, leeches and earthworms, though enclosed living within the perforated spheres, when introduced into the cavity of the stomach, were dissolved as inanimate animal matters by the agency of the fluid of the stomach.

As a fourth mode of obtaining information on the nature of digestion, and the effects of the agent by which it is accomplished, may be mentioned the method of M. Montegre, formerly noticed also in the seventeenth volume of this Journal. This consisted in bringing up, by the eructating or ruminating faculty of the stomach, its fluid contents, submitting them to examination, and then subjecting to the action of this fluid in circumstances, as nearly as possible, analogous to those of the cavity of the stomach, various alimentary articles, and in ejecting from the stomach by the same means various articles of food at different periods after the commencement of the process of digestion. This method is from its nature extremely imperfect, and furnishes only very partial results, and results upon which it is impossible to place any reliance.

As a fifth method may be mentioned the combination of experiments in the various stages and organs of digestion, as performed in the lower animals, with the information furnished by accurate chemical analysis, improved as it has been by the multiplied and powerful resources of modern chemistry. This was the method pursued by Tiedemann and Gmelin, Leuret and Lassaigne, of the results of whose labours sufficiently detailed accounts are given in the twenty-seventh and twenty-eighth volumes of this Journal. This method, which unites the advantages, and applies the information of all the others excepting the third, is perhaps the most perfect and satisfactory, and has accordingly furnished a larger amount of accurate and instructive information than any of the others, and has tended to give precision and confirmation to the researches of previous authorities.

But, however complete be the chain of evidence thus formed on this curious process, there are various points on which information was still wanted, in order to elucidate certain of the effects produced on the stomach and its circulation and motions by alimentary articles, and the progressive changes effected on the latter by the fluids and the fibres of the stomach within the cavity of the organ. There remained only one mode in which this could be accomplished in the human body; viz. to watch in those rare and uncommon instances in which the interior of the stomach happened to be exposed to view by disease or by accident, were such an occurrence compatible with the continuance of the life of the individual, the actions going on, and the changes induced in the various stages of the process of digestion. The extreme rarity, and, it might be presumed, the impossibility of such an occurrence, would in a manner exclude all hope of obtaining information of this kind on the nature of the process of digestion, and might make the physiologist believe that he must rest satisfied with the measure of information, which could be procured from exposing the interior of the stomach in the lower animals.

The occurrence, however, though one of great rarity, has taken place in particular circumstances more than once; and opportunity has been thus afforded of beholding the organ when actively at work. As the instructive series of experiments detailed in the present work were performed in circumstances of the kind now specified, it may be a matter of some interest to notice shortly the cases in which, from similar circumstances, the interior of the stomach was exposed to observation.

The cavity of the stomach has been brought under view in two sorts of cases; first, in consequence of disease, especially some inflammatory swelling or cancerous disorder destroying the external coverings, and by progressive ulceration with adhesion establishing a direct communication between the skin and the villous membrane of the cavity of the stomach; and secondly, in cases of wounds in the epigastric region, in which a ball or a cutting instrument had, in the same manner, established a direct communication by perforating the organ.

Of the first case, which is given by Christian Wencker of Nerlingen, the particulars are as follow.

Margaret Eiguerin, a young orphan girl of Nerlingen, reared in the hospital, and chiefly occupied in very laborious duties as a domestic and agricultural servant, was attacked in the year 1708, at the time of first menstruating, with pains in the left hypochondriac region extending to the mamma; and an abscess having formed, was opened, and discharged much purulent matter; and she appeared then to recover. The pains, however, speedily returned, and another abscess was formed. The severity of the overseers is said to have prevented her complaints from being credited, and it was believed that the pains were only feigned, in order to avoid the hard and laborious duties of the harvest. Meanwhile the painful side swelled greatly, and the stomach, being compressed by the tumour, was irritated to efforts of vomiting, which, however, took place only when excited by the fingers. In this condition, in the year 1712, when she was handing to another servant a sheaf, with her arms elevated and stretched out, with the fork to which it was fixed, the abscess of the left hypochondriac region burst once more, with a loud noise, and discharged a large quantity of purulent and bloody matter, and soon after the food last taken, with fragments of carious ribs, a remarkable quantity of which were further discharged by the bowels. Though the young woman was sufficiently alarmed by this accident, she did not report it to the physician or surgeon, chiefly because, as the aperture was still small, articles of food and drink were not discharged very abundantly. As the suppurative destruction, however, proceeded, the opening daily increased in size, and subsequently gave a larger and more frequent issue to the alimentary matters. As the strength gradually diminished, the patient was almost constantly confined to bed. The appetite meanwhile continued, and with a *fames canina*, or almost wolvish voraciousness, she was obliged to take food every quarter of an hour, and the deglutition of this was followed with cardialgia so intense, that the bandage required to be withdrawn, in order to give a free outlet to the food scarcely taken, and before the articles were converted into chyme. This was followed by great relief; but the urgent sense of hunger requiring a new supply of food furnished once more the beginning of a second scene of torment. The bowels in the meantime continued very slow, and are represented to have been altogether unopened for seventeen successive weeks; and being afterwards opened by clysters, fragments of carious ribs were again discharged. The urine was also very scanty, and the catamenia were scanty and ceased entirely. It was remarkable, however, that at each menstrual period a considerable quantity of pure blood was observed to flow from the aperture of the abscess. Though these symptoms were present, the girl, though pale, was not emaciated or cachectic, but somewhat corpulent; and the breasts were plump.

Meanwhile, along with the alimentary matters, but more frequently while the stomach was empty, there flowed from the wound a yellow-coloured serous fluid, acrid, excoriating sometimes with pain the circumference of the wound, and preventing the patient from lying on her left side. The aperture itself was situate four inches from the *Scrobiculus cordis* towards the left side, and two inches from the left mamma, between the eighth and ninth ribs, of which the great portion, both of the cartilaginous and bony part, was destroyed by caries; and even the cartilage of the tenth rib, which is united to that of the ninth, was wanting, with a considerable part of its bony portion, so that in size it was much increased by the eleventh rib.

The aperture, which was at one time depressed, and two inches broad, was afterwards contracted so as to appear as if it had been made by a moderate-sized musket-ball. By the assistance of a lighted candle were seen, within the stomach, on all sides, firmly attached to the wound, several conspicuous *rugæ*, which strengthened the same near the outlet with circular fibres, representing a sphincter muscle, and dilated and contracted the aperture. The external surface of the skin was every where firm and callous; and the eighth and ninth ribs were united to the sternum either by new cartilage, or at least by some firm body, which could be felt by the finger.

As often as the stomach attempted to expel its contents, it was contracted by a sort of convulsive motion, that is, its anterior part made an upward motion, as is required in vomiting, and its upper part descended with the diaphragm, so that its contents were ejected not gradually but with an immediate impulse.

This miserable mode of existence this woman endured from her nineteenth year in 1712, when the abscess burst, the second time, for the space of twenty-three years, to the year 1735, when she was in her forty-second year,—a space of four years having previously elapsed from the time at which the first formed abscess was opened by incision in 1708. In the first years after the rupture of the abscess, the patient was constantly confined to bed;

but, recovering to a certain extent, she habituated herself to light duties, to which she applied even to the last. The catamenia ceased to flow in the forty-first year. She became at the same time rather lean and wrinkled, being now advancing in years. The appetite also was diminished; but the bowels were rather loose, and discharged more fluid matters. She was further easily affected by cold, often suffered cold sweats, and the feet swelled at night, though the swelling disappeared in the morning.

The sleep was very short, and for some time she was compelled altogether to refrain from taking supper, from the dread of cardialgia, though occasionally the appetite was good, having been formerly accustomed to an abundant evening meal. Immediately after dinner or any meal, the aperture required to be firmly closed, otherwise the last taken alimentary matters speedily escaped. At one time she was wont to diminish with milk the lancinating acrimony of the gastric liquor, or the solvent agent of the stomach, or at least the acrid yellow serous fluid; but towards the latter years of her existence, she could no longer endure the use of milk; which, immediately on being taken, induced squeamishness, and was discharged tinged of a yellow colour, and converted into cheesy matter and curd. The stomach was always injured by hard or farinaceous matters, and by wine, which immediately required to be diluted by a draught of water to prevent it from giving pain. The more tender esculents were more easily borne. She was unable to lie on the back, but was always obliged to turn to the right side.

In this state continued this woman till the year 1739, struggling with various complaints, though not of a very severe character, and which generally subsided under the use of suitable medicine and regulated diet. At length, in the beginning of the spring of 1739, formidable symptoms of hectic fever began to appear, and, continuing to become more urgent, death took place on the last day of July 1739, in the forty-sixth year of her age. Shortly before death, she had expressed an anxious longing for a little boiled chicken; she took it; but immediately rejected it again by vomiting.

Inspection of the body next morning disclosed the following appearances. The aperture, which had existed in this woman's body communicating with the stomach for the space of twenty-seven years, was in the left hypochondriac region, four inches from the *scrobiculus cordis* towards the left side, and two from the left mamma, between the first and second false ribs, and was of capacity sufficient to admit the thumb, enclosed around with ossified cartilage; while so much of the *rectus* was destroyed, that the subjacent bowels were seen through the peritoneum. The stomach was of average size; on its external surface not differing much from the state of health, and with the perforation in the middle almost of the large curvature, where the organ was most firmly adherent to the external margin of the aperture. Towards its superior or left orifice, it was extended to the size of the fist, and the membranes were strong, and surrounded by a notable quantity of fat; the rest of the organ, towards its inferior or right aperture, was so much contracted that its cavity was not one inch in diameter; the pylorus itself being considerably contracted. The cellular and villous coat, by the aid of the rugæ, had here formed a sort of sphincter, so that only the small and thinnest portion of the food could pass by the pylorus into the *duodenum*. The residual part, delayed by the enlarged rugæ, compelled the patient not long after each meal to open the aperture externally, and give issue to the contents of the stomach, or reject them by vomiting. The omentum was thin, but expanded.

The intestines, both small and large, were unusually contracted and narrow.

The spleen was small, and traversed by many small steatomatous tumours. In the upper surface of the liver, also, were various steatomateous tumours, one as large as a hen's egg; and the lower surface of the left lobe was firmly adherent to the stomach.*

The next case bearing on the present subject is given by Richerand in his Elements of Physiology, and is to the following effect.

A woman, forty-seven years of age, was admitted into the Hospital de la Charité at Paris, under the care of Corvisart, in the year 1801, with a fistulous aperture in the epigastric region, communicating with the interior of the stomach; and died in December 1801, after remaining in the hospital about six months.

According to her own account, she had, when at the age of twenty, fallen on the threshold of a door, and received a violent blow on the epigastric region, on which she lighted with the whole weight of her person. The part continued affected with pain, and she became incapable of walking or sitting, otherwise than bent forward and to the left side. At the end of eighteen years, an oblong inflammatory tumour appeared on the injured spot; and during a fit of sickness and vomiting, the tumour burst, and there issued at the wound made by the rupture, two pints of fluid, which the patient had swallowed immediately before. From that time, the fistula, which at first would scarcely admit the tip of the little finger, increased in size daily. At first it allowed only fluids to pass; but on the eighth day, the solid food came away freely, and continued to do so during the whole subsequent period of her life.

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* Virginis per viginti septem annos ventriculum perforatum habentis historia et sectio. Auctore Christiano Wencker, Nerolingensis. Argentorati, 17 April 1743. Haller, Disput. Chirurg. T. v.

While she was in the hospital, the fistulous opening was of an elliptical shape, an inch and a-half long, and more than one inch broad, situated at the lower part of the chest, at the upper and left side of the epigastric region, and afforded M. Richerand an opportunity of viewing the inner part of the stomach, which, when empty, appeared of a vermilion colour, was covered with mucus, its surface wrinkled with folds about half an inch deep, and allowed the observer to distinguish the vermicular undulations of the folds, and of all the parts which were in view.

At the period of admission, this woman ate as much as three women of her age; she voided about one pint of urine; and the bowels were emptied only once in three days. The excrements were yellowish, dry, and rounded, and weighed more than one pound. The pulse was very feeble and extremely slow, rarely exceeding forty-five or forty-six beats in the minute. Three or four hours after a meal, an irresistible desire obliged her to remove the lint and compresses with which the fistulous opening was covered, and to give issue to the food contained within the stomach, from which it escaped rapidly with a noise and a certain quantity of gaseous contents. The alimentary debris thus discharged exhaled a mawkish smell, and was in the form of a grayish-coloured pulp, neither acid nor alkaline. The transformation was far from being always complete. Sometimes the smell of urine could not be recognized; and the bread formed a viscid thick soft substance, similar to fibrine newly precipitated by the acetous acid, and it floated in a tenacious liquid of the colour of common broth.

From the experiments performed at the Ecole de Medecine on these half-digested substances, and on substances of the same nature before introduction into the stomach, it appeared that the changes which they undergo consist in the increase of gelatine, in the formation of a substance presenting the appearance, but not all the properties of fibrine, and in a larger proportion of hydrochlorate and phosphate of soda and phosphate of lime.

The patient was unable to sleep until she had previously emptied the stomach, which was effected by swallowing one pint of infusion of chamomile. In the morning there was seen in the stomach a small quantity of a ropy fluidlike saliva, not homogeneous, but presenting among the fluid parts, particles of some consistence, and even opaque albuminous flakes, and not affecting the colour of the vegetable blues. The experiments performed on it showed that this fluid bore a close analogy to saliva, but was less liable to decomposition.

The vermicular motion by which the stomach emptied itself of its contents, took place in two different, but not opposite directions, the one impelling the food towards the fistulous opening, the other towards the pylorus, through which the smallest quantity was allowed to pass.

On inspecting the body of this woman, it was found that the fistula extended from the cartilage of the seventh rib on the left side as high as the osseous termination of the sixth rib; its edges were rounded, and from three to four lines thick, and were covered by a thin moist delicate skin, of a red colour, similar to that of the lips. The peritoneal coat of the stomach adhered so firmly to the abdomino-muscular peritoneum round the opening, that the line of adhesion could not be observed. The aperture was in the anterior wall of the stomach, at the union of the two-thirds, on the left or cardiac side, with the third on the right, or pyloric side of the viscus, that is about eight inches from the larger or cardiac extremity, and four inches from the pylorus. It extended from the large to the small arch.

Life in this case was supported chiefly by the small quantity of food which passed through the pylorus into the *duodenum*, where it underwent the complete solution and transformation which is necessary to perfect digestion. It is indeed true, that there was nothing to prevent the absorbents and the veins of the stomach from taking up a certain quantity of nutritious particles; but M. Richerand justly argues, that this small quantity of food not being completely transformed and assimilated, must have been of little service in imparting nourishment.

From the phenomena presented by this case, the following facts were ascertained. 1. Soon after the introduction of food into the stomach, the parietes of the stomach are called into action; its circular fibres contract in different points, so as to embrace its contents with some degree of firmness; at the same time its vessels become fuller, and the membrane rather redder; the peristaltic contractions at first irregular and uncertain, become more regular, and cut from above downwards, and from the cardiac to the pyloric orifice. 2. The stomach is shortened in its longitudinal direction, so that its two orifices are mutually approximated. M. Richerand further inferred, that in these motions the stomach rises over the pylorus, so as to diminish greatly, if not to obliterate, the angle formed by the pylorus with the *duodenum*, and thereby facilitate the transmission of the food into the latter. 3. Different articles undergo in the same time different degrees of conversion.

The circumstances under which this woman was placed were not favourable either for very accurate, very systematic, or long-continued observations on the nature of the digestive process; and the recollection of every physiological reader will suggest various important deficiencies which required to be supplied by evidence of some analogous description. In the year 1822, there occurred to Dr Beaumont, a surgeon in the United States' army, a case of gunshot wound of the stomach, which gave him an opportunity of obtaining more full and satisfactory information on the subject than any single inquirer had hitherto been able to furnish.

Alexis St Martin, a Canadian of French descent, about 18 years of age, of good constitution, robust and healthy, engaged as a voyageur in the service of the American Fur Company, was accidentally wounded by the discharge of a musket on the 6th June 1822, in the lower region of the chest, and upper part of the belly. The charge, consisting of powder and duck shot, was received in the left side of the youth, when not more than one yard from the muzzle of the gun. The contents entered in an oblique direction, forward and inward, blowing off integuments and muscles as large as a man's hand, fracturing and carrying away the anterior half of the sixth rib, fracturing the fifth, lacerating the lower portion of the left lobe of the lungs, the diaphragm, and perforating the stomach.

The whole contents of the musket, with fragments of clothing and pieces of fractured ribs, were driven into the muscles and cavity of the chest.

Dr Beaumont saw him about twenty-five or thirty minutes after the accident, and found a portion of the left lung as large as a turkey's egg, protruding through the wound, lacerated and scorched; and immediately below, another protrusion, consisting of a portion of the stomach lacerated through all its coats, and discharging, through an orifice large enough to admit the finger, the food taken for breakfast.

The wounded and lacerated parts were cleaned of all extraneous matters, the protruding lung and stomach were replaced as far as was practicable, the carbonated fermenting poultice was directly applied, while the surrounding parts were kept constantly wet with a lotion of sal-ammoniac and vinegar, and the spirit of Mindererus with camphor was liberally given internally.

In the course of twenty-four hours, fever, with symptoms of inflammation of the lining membranes of the chest and belly, much difficulty of breathing, and distressing cough, ensued; and twenty ounces of blood were drawn from the arm, and a cathartic was administered. The febrile symptoms were alleviated by the blood-letting. The cathartic medicine, escaping by the wound, produced no effect on the bowels.

On the fifth day, partial sloughing of the integuments and muscles took place. Some of the protruded portions of the lung and lacerated parts of the stomach also sloughed, leaving a manifest perforated opening into the stomach, large enough to admit the whole length of the fore-finger into its cavity, and also a passage into the chest, half as large as the fist, exposing part of the lung, and allowing the free escape of air and bloody mucus.

Violent fever continued for ten days, with typhoid symptoms, and a fetid smell from the wound. On the eleventh day, sloughing was more extensive, the febrile symptoms subsided, and the surface of the wound assumed a healthy and granulating appearance.

For seventeen days whatever entered the stomach by the œsophagus escaped by the wound; and it was requisite to support the patient by nutritious *enemata*, till compresses and plasters could be applied so as to retain the food. During this period no alvine evacuation was obtained, though injections and other means were diligently administered. A few days, however, after firm dressings were applied so as to enable the stomach to retain its contents, the bowels evinced marks of action, and, with the use of enemata, a very hard black fœtid motion took place, and was followed by several similar motions. The bowels then acted regularly.

Meanwhile the sides of the protruded portion of the stomach began after the fourth week to adhere to the costal *pleura* and external wound, so that the contents of the organ issued freely, without the chance of escaping into the cavity of the peritoneum. Cicatrization and contraction of the external wound commenced on the fifth week; the stomach became still more firmly attached to the pleura and intercostal muscles and integuments, yet without any disposition to close the orifice, the margins of which, by its villous membrane, formed a natural sphincter, allowing at intervals slight prolapsus.

When the wound was dressed, the contents of the stomach flowed out in proportion to the quantity recently taken. If the stomach was empty, partial inversion took place, unless prevented by the slight pressure of the finger. The inverted portion, however, was easily replaced by gentle pressure, or a sponge wet with cold water, neither of which produced the smallest pain.

In the seventh week, exfoliation of the ribs, and separation of their cartilaginous ends took place. As the sixth rib was divested of its periosteum, about two inches from the fractured part, Dr Beaumont was compelled to amputate it about three or four inches from its articulation with the rib. After this, various accidents occurred, tending to retard recovery, and requiring particular modes of treatment, which it is unnecessary to detail. It is sufficient to say, that after secondary suppuration, induced by the discharge of dead bones and cartilages, from about two months to ten months after the receipt of the injury, the patient at length, in April 1823, was recovered so far, as to be able to walk about and perform light work, enjoying good appetite and digestion, and rapidly regaining health and strength.

By the 6th of June 1823, one year from the date of the accident, all the injured parts were sound and firmly cicatrized, leaving, however, the aperture in the side into the stomach, which continued much in the same condition in which it was six weeks after the wound was received. The perforation was about two inches and a-half in circumference, and food and drink constantly escaped, unless prevented by the compress and bandage. The health and strength continued to improve, and the newly formed integuments over the wound became daily firmer. At the point where the lacerated edges of the muscular coat of the stomach and intercostal muscles approach the true skin, the cuticle of the external surface and the mucous membrane of the stomach approached each other very nearly. They did not, however, unite, like those of the lips, nose, &c. but left an intermediate marginal space about a line broad, completely surrounding the aperture, where the true skin and the nervous papillæ remained uncovered, as sensible and irritable as a portion of skin deprived of its cuticle by vesication. This state of the aperture continued for some time, and constituted the principal, and almost only cause of uneasiness felt, from the continuance of the aperture, the introduction of instruments, &c. in the experiments afterwards performed by Dr Beaumont, or in the escape of fluids from the cavity of the stomach.

Frequent dressings, with soft compresses and bandages, were applied, to relieve suffering, and retain food and drink, till the winter of 1823-1824. At this time there appeared forming at the upper margin of the orifice, from the coats of the stomach, a small fold or doubling, slightly protruding, and increasing until it filled the aperture, so as to supersede the necessity of the compress and bandage in retaining the contents of the stomach. This valvular process adapted itself to the accidental orifice, so as completely to prevent the escape of the gastric contents after the stomach was full, but to be easily depressed with the finger.

In the spring of 1824, St Martin had perfectly recovered his original health and strength. But the aperture remained, and the surrounding wound was firmly cicatrized to its edges. This circumstance of a fistulous opening directly into the stomach, suggested to Dr Beaumont the practicability of performing experiments on digestion; and accordingly he commenced in May 1825 his first series of experiments at Fort Mackinac, Michigan Territory. In the month of June, Dr Beaumont was ordered to Fort Niagara, New York, where he continued the experiments till August 1825, when he took St Martin with him to Burlington, Vermont, and thence to Plattsburgh, New York; and from the latter place St Martin returned to Canada, his native place, without obtaining the consent of Dr Beaumont.

The experiments devised and carried on by Dr Beaumont after only four had been completed, now suffered an interruption for the space of four years, during which it appears St Martin, while resident in Canada, married, and became the father of two children, and laboured hard as a voyageur to the Indian country for the Hudson's Bay Fur Company for the maintenance of his family.

Dr Beaumont at this time, viz. in 1829, learning where he was, and that he enjoyed perfect health, made arrangements with the agents of the American Fur Company, who annually visit Canada for the purpose of procuring voyageurs, to find and engage St Martin for the service of Dr Beaumont, if practicable. He was accordingly discovered, and, with his wife and two children, transported from Lower Canada to the residence of Dr Beaumont, at Fort Crawford, Prairie du Chien, Upper Mississippi, a distance of nearly 2000 miles, in August 1829. The side and the aperture into the stomach were in the same state in which they were at the time of his leaving Dr Beaumont in 1825. The health was good. The aperture was still open with the valvular process as formerly observed.

Dr Beaumont now commenced another series of experiments, and continued them with intervals until March 1831. During this time St Martin performed all the duties of a common servant, such as carrying burdens with little or no inconvenience from the wound. He became the father of more children, and enjoyed as good health and as much strength as most men. He subsisted on crude food in abundant quantities, except when his diet was prescribed for particular experimental objects, and under special observance.

In the spring of 1831, he returned with his family to Lower Canada, where he remained until October 1832, in good health, and at hard labour. During this period he was in the midst of the cholera epidemic, while it passed through Canada, and withstood its attack, though hundreds around him fell under its ravages. In November 1832 he again engaged himself to Dr Beaumont for twelve months, and submitted to another series of experiments. He joined Dr Beaumont at Plattsburgh, and accompanied him to the city of Washington, where, with the facilities afforded by the head of the medical department, the experiments were continued from November 1832 to March 1833.

During the whole of these periods, from the spring of 1824 to the time of the publication of Dr Beaumont's experiments in 1833, St Martin enjoyed general good health, and suffered less predisposition to disease than is common to men of his age and circumstances. He was active, athletic, and vigorous; eating, drinking, and working like other healthy and active persons. For the latter four months of the period above specified, he was unusually plethoric and robust, though constantly subjected to a continued series of experiments on the interior and contents of the stomach,—in the course of which there were introduced or extracted by the aperture, different articles of food and drink, elastic gum catheters, thermometer tubes, gastric fluid, chyme, &c. often daily, sometimes every hour.

In the course of these different series of experiments, various facts were brought to light, illustrating either the circumstances of the case, or the peculiar phenomena of digestion. To the latter chiefly we at present direct attention.

The mode of extracting the gastric juice.—The method usually employed by Dr Beaumont for extracting gastric liquor, or that by which it is believed digestion in the stomach is accomplished, is by placing the subject on his right side, depressing the valve within the aperture, introducing a gum elastic tube of the size of a large quill, five or six inches within the stomach, and then turning him on the left side until the orifice becomes dependent. In health, and when free from food, the stomach is usually entirely empty and contracted upon itself. After the introduction of the tube, the fluid begins to flow, first by drops, then in an interrupted and sometimes in a short continuous stream. Moving the tube about, up and down, or backwards and forwards increases the discharge. The quantity of fluid ordinarily obtained is from four drachms to one ounce and a half or two ounces, varying with the circumstances and condition of the stomach. Its extraction is usually attended with the peculiar sensation at the pit of the stomach termed sinking, with some degree of faintness, which renders it necessary to stop the operation. The usual time of extracting gastric fluid was early in the morning before the subject had eaten, and while the stomach was empty and clean.

On placing St Martin horizontally on the back, pressing the hand on the hepatic region, agitating a little, and at the same time turning him to the left side, bright yellow bile flowed freely through the pylorus and passed out of the tube. Sometimes without this operation it was found mixed with the gastric juice. This, however, was seldom the case, unless when it had been excited by some other cause.

The chymous fluids were easily withdrawn by depressing the valve within the aperture, laying the hand over the lower part of the stomach, shaking a little, and pressing upwards. In this manner any quantity necessary for examination and experiment could be obtained.

The Valve.—The valvular process already mentioned is formed by a portion of the inner or villous coat of the stomach, slightly inverted (everted) and fitted exactly to fill the aperture. Its principal and most external attachment is at the upper and posterior edge of the opening. Its free portion hangs pendulous, fills the aperture when the stomach is full, and plays up and down simultaneously with the respiratory muscles when the organ is empty.

On depressing the valve when the stomach is full, the contents flow out copiously. When the stomach is nearly empty and quiescent, the interior of the cavity may be examined to the depth of five or six inches, if kept distended by artificial means; and food and drink if swallowed at this time, may be seen entering the organ through the ring of the œsophagus. The perforation through the walls of the stomach is about three inches to the left of the *cardia*, near the left superior termination of the great curvature. When entirely empty the stomach contracts upon itself, and sometimes forces the valve through the orifice, together with an additional portion of the mucous membrane, which becomes completely inverted (everted ?) and forms a tumour as large as a hen's egg. After lying on the left side, and sleeping a few hours, a still larger portion protrudes, and spreads out over the external integuments, five or six inches in circumference, fairly exhibiting the natural *rugæ*, villous membrane, and mucous coat, lining the gastric cavity. This appearance was almost invariably exhibited in the morning before rising from bed.

We see here in the history of the formation of this valvular process, and of its motions and the changes to which it is liable, a curious instance of the resources possessed by the organic tissues, in providing against certain inconveniences and evils which might impede, interrupt, or retard the functions performed by these tissues, or the organ which they contribute to form. Not only was this process formed from the villous tissue of the stomach for the purpose of retaining the food a sufficient time within the stomach, to secure the great object of digestion within the stomach, but it was made to undergo certain changes, at those periods when its resistance was not so urgently required. As a similar process with similar functions was formed at the aperture into the stomach in the case of the woman Margaret Eignerin, it may be inferred that it is a provision made by the organic textures to compensate in some degree for the inconvenience caused by the want of support and general pressure, and the interruption of continuity in the parietes of the stomach.

The results of the experiments performed by Dr Beaumont may be arranged under the following heads, according as they illustrate the different points mentioned. 1. The different degrees of digestibility of different alimentary articles. 2. The alleged cause or causes of the sensations of hunger and thirst. 3. The cause of the feelings of satisfaction and satiety after taking food. 4. The influence of the preliminary changes of gastric digestion, as mastication, insalivation, and deglutition. 5. The changes effected by digestion within the stomach. 6. The appearance of the villous coat in healthy and morbid states; and 7. The passage of chyme into the duodenum and the ultimate changes in that bowel.

1. *The different degrees of digestibility of different alimentary articles.*—On the first topic, namely, the relative digestibility of different alimentary articles, Dr Beaumont sees reason to controvert the accuracy of the usually established principle, that animal matters are *cæteris paribus*, more easily assimilable than vegetable matters. He allows, however, that vegetable aliments may take a longer time to undergo the chymous transformation. But he still maintains, in opposition to what has been speciously believed and taught by many physiological authors, that the most innutritious vegetable and the most animalized substance, require the same action of the gastric solvent, and that the elements of animal matters require to be as completely separated, dissolved, and decomposed, as alimentary articles from the vegetable kingdom. It appears, indeed, from several of the experiments, in which vegetable and animal aliments, as cabbage and portions of beef boiled or raw, were at the same time introduced into the stomach through the aperture, and there subjected to the action of the gastric fluid, that the vegetable articles were more completely and more speedily, or in a shorter time, dissolved than the animal aliments. (Exp. 1. First Series.)

At the same time, it must be observed, that there is in the conclusions here advanced some inconsistency which we cannot well explain. Thus, in the 26th experiment, in which, after St Martin had dined on bread and eight ounces of recently salted lean beef, four ounces of potatoes, and four ounces of turnips boiled, Dr Beaumont, fifteen minutes after, found the meat of a portion withdrawn in an incipient state of digestion; forty-five minutes, the meat and bread only visible, but in a still more advanced stage of digestion; and in a third portion, at two hours after, small particles of vegetables made their appearance. "This experiment," the author thinks, tends to confirm "the opinion generally entertained by medical men, that vegetables are less easily disposed of by the gastric organs than animal or farinaceous articles." And, again, in the table of the comparative digestibility of different articles of food, it appears that sweet mellow raw apples were digested in one hour and a-half; that sour mellow raw apples and raw cabbage, with vinegar, were each digested in the course of two hours; that potatoes, roasted or baked, and raw head of cabbage, each took two hours and a-half; whereas roasted lean beef and boiled beef-steak took three hours in undergoing the digestive transformation; and boiled salted salmon, fried beef, broiled veal, and boiled or roasted fowls occupied four hours in the same process within the stomach.

There is something not very consistent in these different statements; and not only the experiments, but daily experience and observation, would lead to the inference, that the digestibility, or the perfect transformation of vegetable and animal matters, is not exactly equal; that the former are, if the quantities be the same, convertible in a shorter time, but that their conversion is accompanied with circumstances somewhat different from those which attend the digestion of animal matters.

It appears further, from the tables given by Dr Beaumont, which, indeed are carefully formed from the experiments, that boiled rice, boiled pig's feet, and boiled tripe, are the articles most rapidly digested, each of them being dissolved in the course of a single hour, that such substances as sago, tapioca, and barley, take longer time in being transformed, the first occupying one hour and three-quarters, and the other two, each two hours ; that baked corn bread, that is, we presume oat-bread, occupied three hours and a quarter, and baked wheat bread took three hours and a-half in transformation, while beef, pork, and mutton, dressed in the simplest way, all take about three hours. The kind of animal matter which Dr Beaumont found to be most rapidly and easily transformed in the stomach of St Martin was broiled venison steak, which took only one hour and thirty-five minutes. (Exp. 29.)

Lest it might from these facts be imagined that certain forms of animal food might be more safely given in febrile states of the system than vegetable articles, Dr Beaumont observes that the digestive fever, or that increase of heat and fulness and frequency of pulse, which are observed to follow digestion, especially of animal matters, is the effect not of a different kind of stimulus, but of the introduction of a greater quantity of chyle, or the nutritious principle of food into the torrent of the circulating fluids. This excites the system precisely in the same manner he thinks as ardent spirits or other stimulus does, with the exception that its effects are more permanent.

This explanation appears to us not satisfactory. The chyle either of animal or vegetable food is a true stimulus, in so far as it is miscible with the blood, and is eventually incorporated with it; and the reason of the slight increase of heat and apparent fever, which, however, is most marked in delicate unhealthy invalids, is, that it both increases the amount of the circulating fluid and changes its quality or qualities. With spirit it is different. It is not in any quantity miscible with the blood, and is not capable of incorporation with its elements. When introduced into the current of the circulation, it is a body altogether foreign, acts in all respects like a poisonous agent, however feeble; and the effects which it seems to produce in the way of stimulation or excitement, are manifestly due to its retarding the motion of the blood in the capillaries, and producing there temporary stagnation and congestion. It is a foreign body which excites both the blood and the tissues to reaction, in order to resist its presence and introduction, and the reaction continues so long as it is present.

2. *Theory of Hunger.*—The opinions given by various physiologists upon the cause of the peculiar sensation denominat-

ed hunger have been various and not satisfactory. Dr Beaumont infers, not very confidently indeed, that the sensation is produced by a distension of the gastric vessels, or that apparatus, whether vascular or glandular, which secretes the gastric juice; and he believes it to be the effect of repletion by this fluid.

One reason which, among others, induces him to entertain this opinion, is the fact, that the internal sensations referred to different organs are caused by some modified action or condition of the parts in the tissues of the organ itself. The modification in the parts, to which the sense of hunger is invariably referred, is caused, Dr Beaumont conceives, by a distension by the gastric juice of a particular set of vessels or glands, constituting in part the erectile tissue of the villous coat of the stomach. The sensation varies, he argues, according to the different degrees of distension, from the simplest desire to the most painful sense of hunger; and is allayed or increased according to the application or refusal of alimentary stimulus to the excreting vessels. The greater the distension of the vessels, the more acute will be the pain; and hence the difference between a short and a protracted fast. In the same manner, also, he views appetite and hunger as different degrees of the same sensation.

In proof of the justice of this view, he also adduces the fact of the feeling of relief and even gratification by the emptying of the gastric vessels, on the introduction of food into the stomach. It is certain, he says, that at every time at which food is introduced into the stomach, the secretion of a quantity more or less considerable, of fluid, which has been ascertained to possess solvent properties, takes place. This fluid is contained in vessels, which, immediately before, must have been distended. The discharge of this fluid ensues on the introduction of food; the sensation is relieved or entirely removed.

This hypothesis is by no means free from objection. Dr Combe, the English editor, has well remarked, that the rapidity of the discharge of the gastric fluid on the introduction of food is no conclusive proof of the previous existence of fluid within the vessels; as we know that the same discharge takes place as to the salivary fluid at the sight, or even the simple thought of viands; and any thing that acts on the mind in the way of anxiety, or distress, or grief, instantaneously almost destroys the sensation of appetite and hunger. The sensation of hunger, or rather the perception we should term it, as Dr Combe observes, is doubtless seated in the brain; the exciting cause of that sensation is in the stomach. It hence results, that not only must the stomach be in a healthy state, but the brain or the sensorium must also possess all its percipient faculties in full energy, and the mind must be easy and tranquil. Any one who has observed or felt in himself the manner in which anxiety for the health of a dear friend operates on the appetite, and what a complete extinction of the appetite the death of a relative or friend produces, must see how much depends on the state of the mind.

Another circumstance may be added in proof of the unsatisfactory nature of this hypothesis. It is well known that the sense of hunger may be much relieved by the use of a tight bandage or girdle round the epigastric region; and, in point of fact, many savage tribes, who are exposed, in their long-continued hunting or travelling excursions, to protracted fasts, employ with success this method to assuage the keenness of the pangs of hunger. It is almost superfluous to observe, that this cannot operate by relieving the distension of vessels.

3. *Satisfaction and Satiety.*—The first of these sensations, which is entirely instinctive, is caused, the author thinks, by the quantity of food taken at any given time being in exact relation with the amount of gastric fluid secreted. If the quantity of food taken be greater than the proportion of gastric fluid secreted, that is, —than is sufficient to effect an easy solution within a reasonable time, then it produces the feeling of satiety, or sometimes of surfeit. Much depends on the influence of habit. For in certain circumstances, for instance, after a long fast, Dr Beaumont believes that a quantity of food which might at other periods, and in other circumstances, be too much for the solvent powers of the amount of gastric fluid secreted, may be taken with impunity, because the fluid will thus be secreted in greater abundance, and more in proportion to the increased quantity of food. The excessive quantity of food under any other circumstances, and more especially habitually or frequently taken, is, doubtless, the cause of the uneasy feelings so often felt by epicures, gluttonous persons, and dyspeptics.

4. *Mastication, Insalivation, and Deglutition.*—The necessity of comminution or mechanical division of the food to easy, healthy, and complete digestion, Dr Beaumont has proved in a very pointed and conclusive manner in several experiments, but especially in the first experiment of the first series, in which alimentary articles introduced through the aperture into the stomach without having undergone mastication, gave rise to symptoms of feverishness, headach, uneasiness at the stomach, with general debility and lassitude, and in which these external feelings were connected with a rancid smell and taste of the fluids within the stomach.

Though Dr Beaumont has been led by his experiments to agree with all physiologists in attaching great importance to the process of mastication or mechanical division, he differs from them as to insalivation, which he thinks has almost no more influence than admixture with water. The argument derived from the dyspeptic symptoms presented by persons labouring under fistulous sores or other diseases of the salivary glands, and those presented by maniacal patients, who, it is said, spit incessantly, he thinks of no moment, because he maintains that the effects are in both cases ascribed to wrong causes. In the first case it is easy to see that a foul ulcer of the mouth may give rise to dyspeptic symptoms; and as to the second, in most maniacal patients, he observes, the alimentary functions are much deranged. He contends also, that though those who smoke tobacco are often spitting, yet they are not peculiarly liable to dyspeptic symptoms.

There is in all this something like special pleading. It is very true that some obstinate and persevering smokers do escape dyspeptic symptoms; but it is after all a mere escape, and considerable numbers of those who indulge in the constant use of the fragrant weed, do suffer more or less severely from dyspeptic symptoms.

5. *Digestion by the Gastric Juice; Chymification.*—The most important point under this head is the analysis of the gastric fluid. It is well known that Dr Prout first,* and afterwards Mr Children, ascertained the presence of free hydrochloric acid in gastric liquor. Hitherto it may be doubted whether the specimens of gastric fluid submitted to analysis were pure; and the circumstances of the case of Alexis St Martin afforded peculiar facilities for obtaining the liquor in a pure form, and ascertaining the exact nature of its constitution. Gastric fluid obtained in the manner already indicated was analysed first in 1832–3, by Professors Dunglison and Emmett, and afterwards in August 1833 by Dr Silliman, Professor of Chemistry in Yale College. The examination of the former two gentlemen showed, as that of Dr Prout had previously done, the presence of a large proportion of free hydrochloric acid, some free acetic acid, phosphates, and hydrochlorates with bases of soda, potassa, magnesia and lime, and an animal matter soluble in cold water but insoluble in hot. Dr Silliman in like manner ascertained the presence of a large proportion of free hydrochloric acid, a little sulphuric acid, and phosphoric acid, with some animal matter.

The gastric fluid Dr Beaumont regards as altogether a chemical agent, and, operating upon chemical principles, and he is further led to consider the transformation effected upon alimentary articles as purely chemical, (p. 75.)

This agent appears, according to his observations or rather inspections, to be secreted from numberless vessels, distinct and separate from the mucous follicles. These vessels, when examined by the microscope appears in the shape of small lucid points, or very fine *papillæ*, situate in the interstices of the follicles. (Experiment 12.) They discharge their fluid only when solicited to do so by the presence of aliment or by mechanical irritation.

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* Philosophical Transactions, Vol. lx. London, 1824. Part i. p. 45.

Pure gastric fluid, when directly extracted from the stomach of a healthy adult, unmixed with any other fluid excepting mucus of the stomach, with which it is commonly, perhaps always, combined, is a clear transparent fluid, inodorous, a little saltish, and very perceptibly acid. Its taste, when applied to the tongue, is similar to thin mucilaginous water, slightly acidulated with hydrochloric acid. It is readily diffusible in water, wine, or spirits; effervesces slightly with alkalies, and is an effectual solvent of the *materia alimentaria*. The property of coagulating albumen it possesses in an eminent degree, and hence its first operation on all albuminous articles of food, as milk, eggs, &c. is to coagulate them; it is powerfully antiseptic, checking the putrefaction of meat; and when applied to old fetid sores and foul ulcerating surfaces, it effectually restores healthy action.

Saliva and mucus are sometimes abundantly mixed with the gastric fluid. The mucus may be separated by filtering the mixture through fine linen or muslin-cambric, when the gastric fluid and part of the saliva pass through, while the gastric mucus and frothy part of the saliva remain on the filter. When not separated by the filter, the mucus gives the fluid a degree of ropiness which does not belong to the gastric juice, and falls to the bottom in loose white floculi. Saliva imparts to the gastric fluid an azure tint and frothy appearance; and when in large proportion, renders it fetid in a few days; whereas pure gastric fluid may be kept for many months without becoming fœtid.

The gastric fluid does not begin to accumulate in the cavity of the stomach, until alimentary matters be received, and excite its vessels to discharge their contents for the immediate purpose of digestion. It is then observed to ooze from its proper vessels, and increases in proportion to the quantity of aliment naturally required and introduced. A definite proportion of aliment only can be perfectly digested in a given quantity of the fluid. From experiments performed on artificial digestion, Dr Beaumont infers that the proportion of juice to the *ingesta* is greater than is generally supposed. He considers its action on food as indicative of its chemical character. Like other chemical agents it decomposes or dissolves, and after combining with a fixed and definite quantity of matter, its action ceases. When the gastric fluid becomes saturated, it refuses to dissolve more; and if an excess of food have been taken, the residue remains in the stomach, or passes into the bowels in a crude or indigested state, and frequently becomes a source of nervous irritation, pain, and disease, for a long time; or until the *vis medicatrix naturæ* restores the vessels of the organ to their natural and healthy action, either with or without the aid of medicine.

Though these may be regarded as the usual appearances and properties of the gastric juice when pure and in the healthy state of the stomach, yet it is liable to considerable variations depending on the admixture of other fluids, as saliva, water, mucus, and sometimes bile; and the author appears to think pancreatic juice. Though the special solvent he represents to be always the same, yet he allows that it is liable to be more or less, sometimes considerably changed by derangement in the digestive organs, slight febrile disorder, fright, or any other sudden affection of the emotions or passions. Overloading the stomach with food is followed by acidity and rancidity within the organ, with retarded solvent action in the fluid. General febrile irritation or disorder seems entirely to suspend its secretion into the gastric cavity; and in this state the gastric villous membrane is always found dry, red, and irritable (Exp. 23,) while externally, headach, pain and distress about the epigastric region, with lassitude and loss of appetite, take place. In such circumstances, it does not obey the alimentary stimulus; and it is of the utmost importance for the physician to be thoroughly impressed with the truth and the constancy of this as a physiological fact. As in the febrile diathesis or condition little or no gastric fluid is secreted, and probably the whole circulation and secretion the villous membrane of the stomach is perverted, suspended, or deranged, the propriety of withholding food from the stomach in febrile complaints becomes manifest and urgent. Food cannot then be acted on; it cannot be transformed; it can afford no nourishment; but is actually a source of irritation to the stomach, especially its villous membrane, and through that to the whole system. Food, Dr Beaumont very justly remarks, is then as insoluble as lead would be under ordinary circumstances.

It would be well if these important and correct principles were always known and remembered, and applied in the practice of medicine. On no point is it so difficult to persuade even medical practitioners that food is injurious in such states of the system, as in this. If they would merely remember that at this time and in such circumstances, the villous membrane of the stomach is incapable of furnishing the natural solvent of food, they would surely recognize at once the necessity of withholding even the alimentary stimulus, and allowing the diseased organ a period of rest, until its circulation and secretion were restored to their usual condition.

Conversely, it may be inferred, as a guide to determine the presence of this red, dry state of the gastric villous membrane, that whenever the patient complains of *anorexia*, or loss of appetite, languor, debility, pain at the epigastric region and headach, there is a dry, red state, perhaps unsecreting condition of the membrane, and that all solid food ought to be withheld, and nothing but diluents taken.

Another important fact established by the experiments of Dr Beaumont on this matter, is the circumstance, that fear and anger suspend the secretion of gastric fluid. The latter especially causes an influx of bile into the stomach, (Exp. 32,) and this impairs its solvent properties. This circumstance of bile flowing into the stomach during a fit of anger is, if correct and well-ascertained, a very curious one. It has been long currently believed, and was taught as an established physico-psychological dogma by the ancient philosophers, that one of the most common effects of anger was to cause a flow of bile or gall; and hence not only have we numerous allusions among the classics to this idea, but, in common language, bile was often substituted for anger or wrath, and an angry man was called a choleric man; (*Cholericus*, Pliny). This notion however, was always ranked among those fancies which originated in some play of the imagination, some loose and accidental or supposed connection between the passion of anger and the state of the biliary secretion. If this connection can be proved to be constant, it confirms in a singular manner the accuracy and sagacity of ancient observation.

It would have been very interesting if Dr Beaumont had been able in the same manner to observe the effects of some other emotions, as grief, anxiety, &c. on the gastric fluid and its actions.

Of a notion maintained by Dr Paris, but we believe not so general as Dr Beaumont seems to imagine, viz. that the food must remain in the stomach a short time before it undergoes any change, Dr Beaumont decidedly and strongly controverts the correctness. All his experiments and observations of the phenomena of digestion within the stomach of St Martin, clearly prove that the process of digestion commences with the introduction of food. As soon as food is introduced into the empty stomach, the gastric liquor begins to flow, and is diffused upon the mass in successive portions; and in the same manner it commences its solvent action. The only objection against this view, which is found in the premature or hurried introduction of one meal immediately, or so soon after another, that the first is not thoroughly dissolved, is no objection against the truth of the view here given. It is easily explained by the fact, that the digestion is disturbed and suspended, "because more food is received into the stomach in the aggregate than the gastric fluid can dissolve;" and the author justly observes, that the disturbance will take place as readily when an excessive quantity of food is taken at once, as when the same excess has been perpetrated in rapid and premature succession. Conversely, Dr Beaumont maintains, that even when food is prematurely introduced into the stomach after previous portions, if the quantity be small, no evil results; and in proof of this he refers to the case of children who are in the habit of eating as often as once every hour in the day in small quantities, without experiencing bad consequences, and to that of cooks who are in the habit of tasting at least almost all the different kinds of food which they are preparing for table.

These arguments are to a certain extent well founded and satisfactory. But they do not interfere materially with the principle already established, that all subsequent and premature additions to a meal of sufficient amount are injurious. In the case of children, it is to be observed, that digestion is much more rapid than in youth or adult age, partly from the great waste by the free action at that period of life of all the great excreting emunctories, partly from the materials required for growth. Thus the skin, the bowels, and the kidneys at that age, act with a degree of energy never observed at any other period of life; and even the daily additions made by growth amidst all this incessant activity of excretion, is another indication of the necessity of frequent supplies of food. Is it not likely, that, in accordance with this general activity of vital energy in all other textures and organs, the same energy in the formation and secretion of gastric fluid may take place, and proceed as it were at an equal rate. Regarding the case of cooks, it appears to us doubtful whether that can legitimately or advantageously be brought forward in defence of the view taken by Dr Beaumont; because it is well known that many of these persons do become dyspeptic, and very generally require stimulating or animalized articles of food in order to create artificially an appetite, which is rarely felt in the natural way.

Dr Beaumont next controverts the accuracy of a representation given by Dr Wilson Philip as to the mode or succession in which digestion is performed. That author, our readers are aware, represents digestion to commence at the surface of the alimentary mass, and in proportion as this is transformed into chyme, the portion next in succession is moved by the muscular action of the stomach to the gastric villous membrane, where a fresh affusion of gastric fluid begins to act on that; and so onward in continued succession, till all is dissolved. Though Dr Beaumont agrees with Dr Wilson Philip in believing that digestive solution or chymification commences at the surface of the alimentary substances, yet he thinks that this is true only as respects each individual portion, and not the whole mass. "I have frequently," he says, "taken out portions from the stomach a few minutes after they had been received into that organ, when they appeared to have received a full supply of gastric juice for perfect digestion, when submitted to the artificial mode." He thinks that, when the supply of food is sufficient but not excessive, his observations show that the whole quantity of gastric fluid requisite for its complete solution is secreted and mixed with it in a short time. When a meal unusually full has been eaten, the necessary quantity of fluid, he allows, may be not so easily and rapidly supplied; and, of course, where it consists of articles differing in degree of digestibility, some must be more, while others are less chymified. Dr Beaumont, in short, argues that gastric fluid is governed in its mechanical distribution and chemical agency by the same laws which regulate the distribution and operations of other thin fluids. From numerous examinations of the stomach when seen at work, at least in the human subject, he infers confidently that the particles of food are constantly changing their relation with each other, and that they are mingled with a quantity of fluid, liquids taken during the meal, and, he is disposed to think, water formed synthetically from its elements. The last, we think, the boldest piece of hypothesis; but the author infers it from the fact, that even after a dry solid meal, a considerable proportion of fluid may be observed. It is not unlikely that much of this fluidity is caused by admixture with saliva, which Dr Beaumont so strangely discards as insignificant.

Several accessary circumstances deserve attention, as exercising an influence over the digestive process within the stomach. The opposite conditions, for instance, of exercise and repose after eating, have been supposed to exert some influence on the process. Most persons familiar with this inquiry remember the experiments of Dr Busick Harwood, and the inferences usually deduced from them. From numerous trials, Dr Beaumont is persuaded that moderate exercise contributes considerably to healthy and rapid digestion. This proposition, Dr Combe, the British editor, is disposed to modify, by saying that, after a moderate meal, moderate exercise seems to promote digestion; but that after a meal rather full, such as is taken at dinner, active exercise is rather prejudicial than favourable. Dr Combe further properly adds, that during the latter stages of digestion, beginning one or two hours after eating, moderate exercise is conducive to its accomplishment.

The temperature of the stomach is not at all times the same. In the case of St Martin, it was found to vary from 98° and 99° to 101° and 102°, (p. 209), (Exp. 59), which is the highest rate that it attained. In general, the temperature is higher at the pyloric than at the splenic end (Exp. 75 and 79); it is also increased on taking exercise (Exp. 26–83, and fourth series of experiments).

6. ***Appearance of the Gastric Villous Membrane and Papillæ in healthy and diseased states***—The most original and important part of the work of Dr Beaumont consists in the de-

scription of the characteristic appearances of the human stomach, not as imagined and inferred, but as actually seen in the healthy state, and in the morbid conditions to which it is liable. This may be best given in the language of the author himself.

"The inner coat of the stomach, in its natural and healthy state, is of a light, or pale pink colour, varying in its hues, according to its full or empty state. It is of a soft or velvet-like appearance, and is constantly covered with a very thin, transparent, viscid mucus, lining the whole interior of the organ.

"Immediately beneath the mucous coat, and apparently incorporated with the villous membrane, appear small, spheroidal, or oval shaped, glandular bodies, from which the mucous fluid appears to be secreted.

"By applying aliment, or other irritants, to the internal coat of the stomach, and observing the effect through a magnifying glass, innumerable minute lucid points, and very fine nervous or vascular papillæ, can be seen arising from the villous membrane, and protruding through the mucous coat, from which distils a pure, limpid, colourless, slightly viscid fluid. This *fluid*, thus excited, is invariably distinctly acid. The *mucus* of the stomach is less fluid, more viscid or albuminous, semi-opaque, sometimes a little saltish, and does not possess the slightest character of acidity. On applying the tongue to the mucous coat of the stomach, in its empty, unirritated state, no acid taste can be perceived. When food, or other irritants have been applied to the villous membrane, and the gastric papillæ excited, the acid taste is immediately perceptible. These papillæ, I am convinced from observation, form a part of what are called by authors, the villi of the stomach. Other vessels, perhaps absorbing as well as secretory, compose the remainder. That some portion of the villi forms the excretory ducts of the vessels, or glands, I have not the least doubt, from innumerable ocular examinations of the process of secretion of gastric juice. The invariable effect of applying aliment to the internal, but exposed part of the gastric membrane, when in a healthy condition, has been the exudation of the solvent fluid, from the above-mentioned papillæ.—Though the *apertures* of these vessels could not be seen, even with the assistance of the best miscroscopes that could be obtained, yet the points from which the fluid issued were clearly indicated by the gradual appearance of innumerable very fine lucid specks, rising through the transparent mucous coat, and seeming to burst, and discharge themselves upon the very points of the papillæ, diffusing a limpid, thin fluid over the whole interior gastric surface. This appearance is conspicuous only during alimentation or chymification. These lucid points, I have no doubt, are the termination of the excretory ducts of the gastric vessels or glands, though the closest and most accurate observation may never be able to discern their distinct apertures.

"The fluid so discharged, is absorbed by the aliment in contact, or collects in small drops and trickles down the sides of the stomach to the more depending parts, and there mingles with the food or whatever else may be contained in the gastric cavity. This fluid, the efficient cause of digestion—the true gastric juice of Spallanzani, I have no doubt—has generally been obtained, for experiment, by mechanical irritation of the internal coat of the stomach, produced by the introduction of a gum-elastic tube, through which it has been procured.

"The gastric juice never appears to be accumulated in the cavity of the stomach while fasting; and is seldom, if ever, discharged from its proper secerning vessels, except when excited by the natural stimulus of aliment, mechanical irritation of tubes, or other excitants. When aliment is received, the juice is given out in exact proportion to its requirements for solution, except when more food has been taken than is necessary for the wants of the system.

"When mechanical irritation by a non-digestible substance, as the elastic tube, stem of the thermometer, &c., has been used, the secretion is probably less than when the irritation has been produced by such substances as are readily dissolved in the gastric juice. Alimentary stimulus, when taken into the stomach, is diffused over the whole villous surface, and excites the gastric vessels generally to excrete their fluids copiously; whereas the irritation of tubes, &c., is local, and produces only a partial excitement of the vessels, and a scanty flow of the gastric juice. Hence the slowness in obtaining the clear fluid from the empty stomach through the tube. I have never, on numerous trials, been able to obtain at any one time more than one and a half or two ounces of this fluid after the stomach had disposed of its alimentary matters, however long the period of abstinence had been. The discharge of this small quantity has generally been excited by the introduction of the tube. Ten, fifteen, or more minutes, were necessary to collect even this small quantity. Whenever fluid was obtained in larger quantity, as was sometimes the case, it invariably contained more than the usual quantity of mucus.

"On viewing the interior of the stomach, the peculiar formation of the inner coats is distinctly exhibited. When empty, the rugæ appear irregularly folded upon each other, almost in a quiescent state, of a pale pink colour, with the surface merely lubricated with mucus. *On the application of aliment, the action of the vessels is increased. the colour brightened, and the vermicular motions excited.* The small gastric papillæ begin to discharge a clear transparent fluid (the alimentary solvent,) which continues abundantly to accumulate as aliment is received for digestion.

"If the mucous covering of the villous coat be wiped off with a sponge or handkerchief during the period of chymification, the membrane appears roughish, of a deep pink colour at first; but in a few seconds, the follicles and fine papillæ begin to pour out their respective fluids, which being diffused over the parts abraded of mucus, restore to them their peculiar soft and velvet-like appearance, and pale pink colour, corresponding with the undisturbed portions of the membrane, and the gastric juice goes on accumulating, and trickles down the sides of the stomach again.

" If the membrane be wiped off when the stomach is empty, or during the period of fasting, a similar roughness and deepened colour appear, though in a less degree, and the mucous exudation is more slowly restored. The follicles appear to swell more gradually. The fluids do not accumulate in quantity sufficient to trickle down, as during the time of chymification. The mucous coat only appears to be restored.

" The foregoing, I believe to be the natural appearances of the internal coat of the stomach in a healthy condition of the system.

" In disease, or partial derangement of the healthy functions, this membrane presents various and essentially different appearances.

" In febrile diathesis, or predisposition, from whatever cause—obstructed perspiration, undue excitement by stimulating liquors, overloading the stomach with food—fear, anger, or whatever depresses or disturbs the nervous system—the villous coat becomes sometimes red and dry, at other times, pale and moist, and loses its smooth and healthy appearance; the secretions become vitiated, greatly diminished, or entirely suppressed; the mucous coat scarcely perceptible; the follicles flat and flaccid, with secretions insufficient to protect the vascular and nervous papillæ from irritation.

" There are sometimes found, on the internal coat of the stomach, eruptions or deep red pimples, not numerous, but distributed here and there upon the villous membrane, rising above the surface of the mucous coat. These are at first sharp-pointed and red, but frequently become filled with white purulent matter. At other times, irregular, circumscribed red patches, varying in size or extent from half an inch to an inch and a half in circumference, are found on the internal coat. These appear to be the effect of congestion in the minute blood-vessels of the stomach. There are, also, seen at times small aphthous crusts in connection with these red patches. Abrasion of the lining membrane, like the rolling up of the mucous coat into small shreds or strings, leaving the papillæ bare for an indefinite space, is not an uncommon appearance.

" These diseased appearances, when very slight, do not always affect essentially the gastric apparatus. When considerable, and particularly when there are corresponding symptoms of disease, as dryness of the mouth, thirst, accelerated pulse, &c. *no gastric juice can be extracted, not even on the application of alimentary stimulus.* Drinks received are immediately absorbed, or otherwise disposed of, none remaining on the stomach ten minutes after being swallowed. Food taken in this condition of the stomach, remains undigested for twenty-four or forty-eight hours or more, increasing the derangement of the whole alimentary canal, and aggravating the general symptoms of disease.

" After excessive eating or drinking, chymification is retarded; and, although the appetite be not always impaired at first, the fluids become acrid and sharp, excoriating the edges of the aperture, and almost invariably produce aphthous patches, and the other indications of a diseased state of the internal membrane, mentioned above. Vitiated bile is also found in the stomach under these circumstances; and flocculi of mucus are much more abundant than in health.

"Whenever this morbid condition of the stomach occurs, with the usual accompanying symptoms of disease, there is generally a corresponding appearance of the tongue. When a healthy state of the stomach is restored, the tongue invariably becomes clean."—Pp. 94–100.

The facts here detailed are not less important in throwing light on the functions of the organ, than in explaining the nature of the various deviations from the healthy state to which it is liable. In the latter respect, indeed, they are, if possible, more important, in so far as they explain not only the state of the gastric villous membrane in fits of indigestion, but show how much disorder in circulation and secretion may take place in that membrane, with a disproportionate small amount of external symptomatic effects.

We have here seen that the villous membrane is liable in certain states to become red, dry, and even abraded, or probably raw and tender; that the papillæ were liable to become larger, and covered with viscid puriform mucus, or small and shrunk; and that these phenomena in the stomach are attended with more or less loathing of food, headach, languor, and furred tongue. Even in some circumstances erythematous patches and pimples, probably *papillæ*, enlarged, appear to have been formed on the villous membrane. (Exp. 47.)

One of the most interesting of the observations in an etiological and pathological point of view is given in the fourth series of experiments. In the account of the state of the stomach of St Martin on the 28th July 1833, it is stated that the stomach, though empty at nine in the morning, was not healthy, but that its villous membrane presented some *erythema*, and aphthous patches on the inner surface. It is here added, that St Martin had been *drinking ardent spirits pretty freely for eight or ten days past*; yet he complained of no pain, nor showed symptoms of any general indisposition, and represented himself to feel well, and to have a good appetite. These morbid appearances in the gastric villous membrane continued, and increased for several days. On the 1st of August, when again examined, there was considerable erythema of the inner membrane, and some aphthous patches on the exposed mucous surface; and at the same time the gastric juice, instead of being clear or pure, as in health, was turbid and viscid, indeed, apparently mixed with morbid mucus. On the following day, viz. August 2d, when bile was found in the stomach tinged with blood, which appeared to exude from the surface of the erythema, and the aphthous patches were tender and irritable, St Martin still complained of no sense of pain, indisposition, or even of impaired appetite. On the following day, 3d of August, however, when the erythematous appearance was more extensive, and the spots were more livid, and showed a disposition to effuse drops of blood, when the aphthous patches were larger and more numerous, and the gastric fluid was mixed with a large proportion of thick ropy mucus, and muco-purulent matter slightly tinged with blood, though it is stated that St Martin complained of no symptoms indicating any general derangement of the system, and manifested no very essential aberration of the functions of the stomach, but had good appetite, and slept well, yet it is added that he complained of an uneasy sensation and tenderness at the pit of the stomach, and some giddiness, with dimness and yellowness of vision on stooping and again rising, that his countenance was rather sallow, and his tongue was covered with a yellowish brown coat. The same tendency to bleed from the gastric villous membrane, with an alkaline state of the gastric fluid continued on the 4th, but began to disappear on the 5th of August and was gone on the 6th, leaving the coats clean and healthy, and rendering the gastric fluid again clear and acid. It is important to remark, that during the latter days of this state, St Martin was confined to low diet and diluent fluids, and was not allowed to taste any stimulating liquors, or to indulge in excesses of any kind.

In these morbid changes in the state of the stomach, two circumstances deserve attention. The first, the cause or causes producing them, and the second, their effect on the functions of the stomach and the system at large.

In the particular instance now under consideration, the cause was manifestly the free use, for several days, of ardent spirits; and there is no doubt that the effects here so clearly and perceptibly presented by the villous membrane of the stomach of St Martin, demonstrate, in a most conclusive and irrefragable manner, the noxious effects of these pernicious liquors on the human stomach. If it were possible to present to ocular inspection the villous membrane of the stomach of a spirit-drinker, after two or three days uninterrupted drinking,—red, dry, blood-shot, actually bleeding,—it would do more, probably, to put a stop to this wicked practice than all the temperance societies in the world!

Nor is it to be doubted that the same effects, though less in degree at first, result from the use of vinous liquors, and even the constant use of the stronger fermented liquors. A great delusion is entertained, that, because more wine or strong beer is requisite to produce the same degree of intoxication than ardent spirits, the former are less injurious, and may be taken to greater extent and more freely with impunity. The stimulus and irritation, though differing in degree, are the same in ultimate effect; and, by the increased quantity which is invariably, in this miserable delusion, believed allowable, it is quite possible to produce all the consequences, physiological and pathological, which are here shown to result from the liberal use of ardent spirits.

It is further important to remark, that the same appearances nearly of erythematic redness, dryness, and rawness of the villous membrane of the stomach are produced by every other agent which irritates the mucous membrane. Dr Beaumont states, that improper indulgence in eating and drinking was the most common precursor of these diseased conditions of the coats of the stomach. They have resulted not only from the free use of ardent spirits, beer, wine, or any intoxicating liquor, when continued for days, but from eating voraciously or to excess; from swallowing food scarcely masticated or too rapidly; from the introduction of solid pieces of meat suspended by cords; or of muslin bags, or, in short, any foreign irritating agent if often repeated.

These facts furnish the best commentary on the causes of dyspeptic disorder, and the probable state of the gastric villous membrane in that disorder. They show that any agent tending to irritate the gastric villous membrane is quite adequate to pervert, if not suspend, the functions of the stomach.

The second circumstance deserving notice is the very slight degree of the disorder which takes place in the functions of the system at large, while there is clear evidence that the villous membrane of the stomach is in an unhealthy state. We do not think, indeed, with Dr Beaumont, that no symptomatic effects resulted from the morbid, dry, erythematous redness of the stomach. It appears that the tongue was furred, that, in the course of a few days, the countenance became sallow, and the patient complained of headach and giddiness, with some dimness of vision. All that can be inferred, is, that the erythematous state of the stomach must continue for several days, before it gives rise to permanent or urgent external symptoms.

It must be further admitted, that the gastric villous membrane may undergo great deviations from the healthy state, without giving rise, at least soon, to much general disorder in the system, or even in the functions of the organ. But it does not thence follow that, if these morbid changes are long continued, they will not exert considerable and marked influence on the system. On the cause of this peculiarity we refrain from speculating. An important practical inference results, that very considerable disorder in digestion may often take place, without the patient feeling or manifesting any distinct symptom of such disorder.

In conclusion, this work is of extreme value to the physiologist and physician, and Dr Combe has rendered a most important service to the profession in this country, by publishing the present edition, which is further enriched with many valuable and instructive notes.

It is due to Dr Combe to mention, that, in the second edition of his Physiology of Digestion, he suggested that it would be a great service rendered to science, as well as an honour to themselves, if some of our scientific bodies, as the Royal Society or the British Association, would use their influence in having St Martin brought to Great Britain, in order to investigate experimentally the remainder of the subject under the direction of a committee of their number. This valuable suggestion was last year, in August 1838, brought forward before the Medical Section of the British Association, then assembled at Newcastle. A Chemico-Medical Committee, consisting of Dr Thomson, Dr Prout, Dr Graham, and Professor Owen, was appointed, and authorized to apply to the General Committee for a grant of L. 200 from the funds of the Association, to enable the Chemical Section to bring over to this country, and retain for one year, Alexis St Martin, for the purpose of making physiological and chemical researches on the subject of digestion in connection with the Medical Section. But the application was opposed by a noble member, on the ground that the subject was coarse, and indelicate, and calculated' to disgust; and the grant was refused. (Athenæum, No. 566, p. 638, 1st September 1838.) We must on this occasion say, that we cannot perceive wherein consists the want of delicacy or the coarseness; and to us the fastidiousness by which the opposition to this proposal was suggested, appears to be referable to that species of false delicacy and spurious refinement, which wishes to purify ideas without attempting to purify the objects of which they are the representatives. At all events, indelicacy does not belong to this inquiry any more than it does to the noble science of gourmandise; and of the two, the former is by an infinite number of degrees the least so. So long as man is an eating and drinking animal, and while both his corporeal and mental energies depend so much on the state of the stomach, every thing relating to the correct knowledge of the functions of that organ becomes important; and it is quite absurd to decline inquiries into the phenomena of digestion, in whatever mode conducted, on the false principle now stated.

What is the frame of man altogether, we ask? It is not in one sense an assemblage of processes very disgusting, that is disagreeable and mortifying to our pride, and erroneous notions of excellence. The human frame is indeed a mere earthen vessel, with all the impurities of the materials, from which it is fabricated. But it must be remembered, that this earthen vessel is made the temporary abode of energies and faculties which connect the creature of the earth with a more exalted sphere. The common-place, and, in some respects, humiliating details of the alimentary functions, acquire importance from their necessity to the support of this earthen vessel; and it is a refinement unworthy of the philosophical inquirer to reject information, or the means of information, so long as the means of procuring it involves no moral impropriety.

ART. II.—1. *Diet and Regimen, physical, intellectual, and moral, as means in the prevention and cure of Disease.* By ROBERT DICK, M. D., Glasgow, 1838. Pp. 386.

2. *An Essay on Food, in which the received doctrine of Modern Physiologists respecting the waste of the body is exploded—the cause of animal heat is explained upon new principles—the source whence Nitrogen is derived by Herbivorous animals is established—General Rules for the Preservation of Health are laid down—and the Wisdom of the Divine Economy in all is vindicated.* By W. GRISENTHWAITE. London, 1838. Pp. 119.

THE subject of diet and regimen has occupied a considerable portion of the regards of the physician in all ages and countries, and the subject is certainly worthy of the attention that has been paid to it, both as a means of preventing and curing disease.

Dr William Stark appears to have been the first who made experiments on the human subject regarding the digestibility of various kinds of aliment, and their powers of sustaining life; and it is only to be regretted that his life fell a sacrifice so soon to his zeal in the pursuit of science. His experiments, with the exception of those of Dr Stevens, and more lately those of Dr Beaumont, already noticed, are the only ones which demonstrate, in a satisfactory manner, the action of the human stomach on food. Still it appears quite unaccountable how physiologists, though referring to Dr Stark's experiments, should have so completely overlooked the remarkable results in those cases, where his food was limited for a length of time to one or two articles of diet. Thus, in speaking of limiting the food of dogs to one article, say sugar, or oil, or gum, or butter, physiologists have attributed the leanness, diminished strength, ulceration of the cornea, and death, either to the want of azote in these substances, or to the circumstance of the aliment being of a too highly concentrated nature. But if Dr Stark's experiments on himself be considered with sufficient attention, it will not fail to be perceived that precisely the same symptoms were caused by confinement to an unvaried diet, and which yet could not be said to be destitute of azote on the one hand, nor to be of too highly concentrated a nature on the other. Again, in sea scurvy, we see the very same symptoms exemplified which were produced in the person of Dr Stark, and in the dogs experimented on by Majendie and others, when they were confined for a length of time to one unvaried kind of food. The symptoms, in fact, seem to have the same origin in all, viz. the unvarying nature of the diet; and this assertion appears to be borne out by the fact, that, where care is taken to vary the diet, scurvy never makes it appearance; and it is in all probability more owing to the great attention now paid to the varying the diet of seamen than to the small allowance of vegetable acid, that the present freedom from this disease is to be attributed.

The experiments of Dr Stevens and Dr Beaumont, again, were chiefly directed to ascertain the relative digestibility of different kinds of food, and are extremely valuable in enabling us to regulate the diet of invalids.

The work of Dr Dick is arranged in three great divisions. 1. Of Food in all its forms, and in all its varied uses and applications. 2. Of the Physical management of the body. 3. Of the Mind and its management, the Passions and their regulation.

The author's division of food, which is apparently an attempted improvement on that of Dr Paris, is not fortunate. In fact, from the way in which the author treats the subject, he appears to have himself but a confused idea of the meaning of the terms he uses. In his statements also, he is not consistent, for in one place he speaks of vegetable (as opposed to animal) diet disposing "to lymphatic infiltration, to anasarca (dropsy) and a general tumid relaxation;" and in another as causing a "plethoric complexion, a pulse full and strong, blood thick and rapidly curdling, great muscular vigour and liability to inflammatory diseases." His notions, too, with regard to the uses of oatmeal as an article of diet are quite peculiar; for, first, he accuses it of causing "a laxity of the tissues," and then states that it ought to be given up as an article of food for man, and "only be a matter of history." Now one would scarcely expect a Scotsman, who ought to know better, to speak so, seeing that it is a matter of fact that the hardiest race of men in the world, the Highlanders of Scotland, subsist almost entirely on this article of food; and it cannot surely be asserted of that iron-sinewed race that they are much annoyed with "laxity of tissues."

But the author, not satisfied with expressing his disapprobation of the "staff of life" of one hardy race, also condemns that of another; for were we to believe the author, the potato, instead of being a blessing to every country where it has yet been introduced, has even already proved a curse by increasing tenfold the number of dyspeptic cases. This wholesome farinaceous root the author condemns as decidedly hurtful, "especially when boiled, and more particularly when boiled in the skin;" and if it must be eat, he says it ought to be "fried in oil or butter;" and why fried? because frying "seems to me to deprive that root more thoroughly of its *poisonous property* than any other mode of cooking." We should not have previously thought that a dish of "fried potatoes" would be the best food for a dyspeptic patient; nor yet toasted cheese, though recommended by the author.

With regard to the potato being hurtful as an article of diet the author has adduced no proof; and till such proof be brought forward, we must consider it as the species of nourishment of all others the best adapted for sustaining and bringing to perfection the physical powers of man. We have the example of nearly a whole nation of the most robust peasantry in the world, the Irish, nourished from their earliest infancy to life's latest span with the potato, and little else than the potato; yet we never heard of its causing dyspepsia among them. Besides, amongst what class is it we meet with dyspeptics chiefly; not those whose chief diet is porridge and potatoes, but amongst those who use the potato as the Frenchman does bread, as a help, and to different kinds of animal food.

We must candidly admit, however, that the author does not condemn this root, without proposing a substitute, which, "if employed more and the potato less," he has no doubt whatever would give a death-blow to dyspepsia. And what is this substitute? Beet-root, carrots, turnips, parsneps, cauliflower, asparagus, &c. which we fancy means all pot-herbs. The author's ideas of dyspeptic stomachs, and their powers of digestion, must certainly be allowed to be at least singular.

But, before leaving this subject, let us for a moment turn to what the author says of these substances as articles of diet, and we shall have some idea of the consistency of his statements. "A person living on watery, leguminous, or *mucilaginous vegetables* (the very articles above recommended,) would have organs soft, relaxed, without energy,—blood fluid, and be characterized by a disposition to mucous, atonic (low) and cachectic maladies, or those which indicate a vitiated and degenerate condition of the solids and fluids;" "the energy of the mind as well as of the body abates," &c. We think, had the author been giving directions how to produce ill health he could scarcely have given other advice.

But our author has discovered a poisonous principle in the potato. Now, it is known that the potato belongs to the poisonous class of plants, the *Solaneæ*, and it has been remarked that a narcotic principle had been met with, in small quantity, in the stems and *roots* of the plant; but, we believe, it was never even affirmed that such a principle existed in the *tuber*. Several other instances, in fact, occur in the vegetable kingdom, where the stems or roots proper are noxious, and the tuber may be eaten with perfect safety.

But this is not the only instance to which we particularly referred, when we stated that the author had discovered a poisonous principle. We alluded to the *Maranta arundinacea*, or arrow-root, which the author has somehow discovered to be "virulently poisonous," and not only so, but that it has received its name arrow-root, from the fact of the "Indians using the juice as a deadly addition to their arrows." It is known that a poultice of the fresh root is applied by the Indians to wounds inflicted with poisoned arrows, to draw out the poison, and abate the inflammation; and also it is known that its name was given from the circumstance, that the Indian arrows are chiefly made from its polished taper stem; but we never before heard that any part of the plant was considered as poisonous. From what untranslated foreign author the writer has taken his information on this subject, we know not; for in his preface we find it stated, that the "matter not original" was derived "entirely from foreign and untranslated authors;" *mis*-translated would perhaps be the proper word. But even this conjecture may be wrong, for it may be "original matter," or it may even be one of those parts of the work to which the author refers in the following words: "In those cases that I am indebted to other authors, I have used the fullest liberty of freely omitting what I disapproved of—of inserting whatever I thought had been omitted—of unceremoniously transposing, enlarging, condensing, and qualifying their statements, and of mingling with these reflections of my own, wherever I judged this advisable."

Erroneous statements, however, should not lead to total omissions, and in mentioning the animal and vegetable jellies, especially when he met with such a paucity of these, he might have taken notice of a very important one which has, within the last few years, been added to our *Materia Alimentaria*, and which, from being so frequently now-a-days presented at table, could be scarcely unknown, one would think, even to the author. We allude to that sold under the name of Irish Moss, consisting of various species of Fucus, and which forms a jelly equally pure with isinglass, and possessing analogous properties.

The author falls into error in representing isinglass as prepared from the *stomach* of the sturgeon, in place of the sound or swimming-bladder; and in describing the "butter of cocoa" as prepared from the chocolate nut, when every one knows that the butter of cocoa is from the fruit of the palm, whilst the chocolate, having no such lofty pretension, ranges itself under a section of the *Malvaceæ.* He has evidently confounded the cocoa with the nut of the *Theobroma Cacao*, an error not creditable in a work on diet.

We must not, however, omit noticing the author's quaint notion of man being a frugivorous animal. He asserts, that, because "man has neither the teeth, the stomach, the claws, nor the habits of a carnivorous animal," because monkeys bear a striking likeness to creations deputed lord"—and are "eminently frugivorous," because a child loves an apple, and man is born naked, his original country must have been between the tropics, and fruit his food.

What a sad change must have happened to "creation's deputed lord" since the race left those tropical woods. Whole nations now seldom taste fruit, or in but slender proportion, and others who live most after the "simple dictates of nature," subsist chiefly on the products of the chace.

The author's division of diet is given in the following simple list:—1. Debilitating diet; 2. Mucilaginous diet; 3. Saccharine or Sugar diet; 4. Acidulous diet; 5. Farinaceous diet; 6. Oleaginous or Oily diet; 7. Milk diet; 8. Gelatinous diet; 9. Fibrous diet; 10, Tonic diet; 11. Exciting diet.

But his discovery of the proper diet for patients labouring under inflammation of the serous tissues is one of his strangest fancies. We are gravely assured that "sweet almond oil and syrup" is the best diet for such cases; and why? because oil has the property of "relaxing the tensity of the tissues inflamed." We presume he means that oil greases the hinges of the rusty or inflamed molecules, and enables them to glide more smoothly on each other.

The author's remarks on fluids are more in unison with common sense and observation, though we are afraid the tea-totallers will hardly approve of the anathemas hurled against their only approved drinks.

The second part of the work, that devoted to the "Physical Regulation of the Body," contains nothing which will not be found more fully and intelligibly stated in the common works on diet and regimen; indeed the whole account is very meagre, and hurried over in a superficial manner. Dr Dick has made a discovery here, however, which we think it but justice to notice, and that is, that towns have an additional advantage over the country, to several others he states, which is, that "epidemics are more rare in them!" The reverse of this has been remarked by every other writer.

Many of his remarks and generalizations with regard to the influence of climate on the physical and intellectual development of man could be easily shown to be erroneous. The idea, that the negro's colour depends on the redundancy of bile in the system is not a new one; and we are not aware of any experiments having ever been made to prove that the flesh of animals of cold countries is *less* nourishing than those of warm ones, for we would be inclined to believe the reverse. And it seems quite fanciful, and rests on no foundation whatever, to assert that wounds of the lower extremities heal faster in dry situations than those on the upper extremities—and *vice versa*, in low countries.

The third and last part of the work is devoted to the "management of the mind, and the regulation of the passions." The author has devoted far too much space to the consideration of one of the passions, we mean that of love; and much that he has stated with regard to the prevention and cure of it might with propriety have been omitted. His account of insanity is the poorest we ever read; he nowhere even tells us what insanity is; it seems merely introduced for the purpose of informing us that he had actually, *in propria persona*, walked through the Bicêtre and Salpetrière, which gives him an opportunity of introducing the history of one of the maniacs, and that again is used as a pretext for introducing us to his own form, pillowed on the very bed which had in succession been tenanted by Napoleon, Chateaubriand, Lamartine, and Sir R. Peel. In a few observations on music, he tells us that every literary man should consider the study and practice of music a *duty*; and ends, like a loyal subject, in commending Her Majesty for her attachment to theatricals and musical entertainments.

Such is a short account of this work on diet; a work, the principal parts of which, the author tells us, are original; and lest it should be supposed they are the crude productions of an untravelled youth, writing for notoriety, he gives us scattered through the volume a tolerably full account of the many places he visited, and what dainties he partook of at each. It seems, indeed, to have been a dietetic tour, if we may so speak. First, we find him on the Continent, where, using a traveller's licence, he tells us of sitting down " often to dinners of four-and-twenty courses." That is very general; but his next announcement is a little more particular; he makes his appearance in France and Italy, where he feeds on the " mavis, a species of lark, a savoury and delicate dish." Next he is in France, partaking of fried potatoes. But these soon yield to the attractions which Switzerland holds out to this gastronome, where he has the pleasure to feed on " snail soup with relish," and stuff it down with dandelion in place of spinache. This he probably found too rich food, for he next makes his appearance on the Jura Alps, subsisting on " a milk surcharged with buttery and cheesy ingredients." But the anchovy at Leghorn soon draws him down from these aërial heights, and these in turn yield to the blackbird at Rome. At length he arrives at Milan, where, as a consummation, devoutly to be expected, we have the satisfaction to be told he was laid up with an attack of gout.

The second work, the title of which is quoted at the commencement of this notice, is remarkable for original and ingenious views. Mr Grisenthwaite, after a few introductory remarks with regard to his object in bringing before the public a work treating of medical subjects, though he himself is not a medical man, remarks, that the opinions with regard to the uses of food are not much further advanced now than they were years ago; and that no satisfactory explanation has yet been given why the body, which has ceased to acquire bulk, should still require such continued daily supplies. In order that he may start with a sure foundation for his reasonings, he quotes the opinion of Dr Gregory, Dr Thomson, and others with regard to the use of food, which are in substance, that it is to supply the losses which the body is constantly suffering in the performance of its various functions; that the solid materials are constantly wasting; and that it is the chief design of food to repair this waste.

Having premised thus much, the author considers this question under the three following heads. 1. The daily demand for food; 2. That, if food be not taken in sufficient quantity, the body wastes; and 3. The deposition and reabsorption of certain colouring matters given with the food.

With regard to this last head he remarks, and we think with great justice, that "this discolorization of the bones surely cannot be urged either as a proof of repairing waste, or assimilation, since the colouring matter is *wholly distinct in its nature and elements from the bones in which it is found.* It can add nothing to their substance; and if it be said that it is deposited at the same time with the fresh phosphate of lime and gelatine, which compose the bones, it is an affirmation without any evidence." The author also on general grounds combats the supposition which physiologists have ever maintained, since Dr Monro's first experiment with madder, that there is continual deposition and reabsorption of structure. "What should we think," says he, "of a piece of mechanism weighing only one hundred and forty pounds, that required two pounds of the material of which it is composed, every day, to repair waste? What example can be found among the most fragile productions of art to approach this dissoluble state of animal machinery? Shall man, admirably organized as he is, and provided as he is by wonderful contrivances to give perpetuity to his structure, be a work that is to be renewed every ten weeks?" The author has here rather overrated the rapidity with which physiologists have asserted the body to be renewed; but this is immaterial for the argument; for we feel quite convinced that nothing like *proof* has ever yet been adduced of the actual absorption of any portion of a healthy structure, whilst in the performance of its normal functions. What takes place during disease is quite another question.

The author next gives *his* theory of the uses of food. And, first, with regard to the *ascertained wastes* which occur in the human body, beginning with the most important, the lose of carbon by the lungs.

It is admitted on all hands that about 40,000 cubic inches of oxygen are consumed in breathing during the twenty-four hours, and that a similar quantity of carbonic acid gas is thrown off from the lungs. This gives us rather more than eleven ounces of solid carbon of clear loss to the body daily. Now the question which naturally arises is, from what source is that loss supplied? and it is not a little remarkable that not a single physiologist with whose works we are acquainted has even thrown out a suggestion on this subject; it is therefore with no small pleasure that we proceed to give a short account of Mr Grisenthwaite's solution.

If a man were to receive no sustenance, and were to go on losing at the rate of eleven ounces per diem, at the end of about ten weeks he would have vanished into thin air. The author therefore considers the source whence so much carbon could be procured, and naturally directs his attention to the food as the source of supply. He therefore looks to the elements of which the food is composed, and, in the first place, supposes the food to consist entirely of farinaceous matters. Now, as is shown by chemical analysis, it would require about twenty-six ounces of flour, or thirty-five ounces of bread, or six and a half pounds of potatoes, to furnish this quantity of carbon alone! But if the food consisted of animal substances, he mentions the astounding fact, that, to supply this daily waste of eleven and a half ounces of carbon, a man would require to consume twenty-one and a half ounces of perfectly dry muscular fibre, or nearly four pounds and a half of fresh meat! and if he did not, his system must waste to supply it. The author is startled himself at the results to which reason alone brings him, and with great justice questions the accuracy of the experiments from which the conclusions were drawn, that eleven and a half ounces of solid carbon are daily thrown off from the lungs, because they assume that the respirations are equal during the day and the night, and that the evolution of carbonic acid gas is equal at all periods of the twenty-four hours, which is very much to be doubted,—and also that the respirations are twenty per minute; nearly a third above the reality. Still in any case the author's reasoning is equally correct; but the circumstance of the estimated wastes being calculated so very high, would make one whose interests were enlisted in favour of old prejudices, to reject as untenable or as wild speculations what are natural and unavoidable conclusions.

But as man lives on a mixed diet, the author next proceeds to consider what quantity of mixed food would be requisite to supply eleven and a half ounces of carbon; and he takes the diet table of an hospital for the sick, which allows sixteen ounces of bread, twelve of potatoes, one of butter, and five and a half of animal food, which in all would yield about eight ounces of carbon; and, as he considers the quantity of carbon daily thrown off by the lungs as estimated far too high, he does not consider this to be poor diet.

Mr Grisenthwaite next estimates the loss by fecal excrementitious matter, renal secretion, and respiration. For the first of these he allows the loss of one ounce and a quarter, to be abstracted from the food, as Berzelius had found it to consist of nearly the same substances as those which constitute our food, the quantity of bile merely amounting to one per cent. As the kidneys are the chief emunctories of the nitrogen, assuming that about three pounds of urine are passed in twenty-four hours, there will be of solid matter about two ounces and a quarter, which chemical analysis has shown will contain about 360 grains of nitrogen, or as much as would suffice to form four ounces of dry muscular fibre, or between twelve and fourteen ounces of fresh meat. "A remarkable coincidence! and quite sufficient to show that the nitrogen of our food is not lodged in the system any more than the carbon; for as we found all the latter carried off by the lungs, so here we find all the former separated by the kidney, *not leaving one grain to repair waste.*"

The next question is, what becomes of all the oxygen and hydrogen of our food? and the author very naturally and logically concludes that, when separated from the other ingredients, as above detailed, they unite and form water; and it is a well-known fact, that very frequently, we might say always, the fluid egesta and exhalations are considerably greater than the amount of fluid taken into the system. He makes no account of the matters (aqueous vapour excepted) carried off by the cutaneous exhalation, these being so trifling in amount as not to interfere with the general results.

Having in this manner satisfactorily shown how the food is thrown out of the body, he proceeds more in detail to combat the old doctrine of the *waste of the system*; and this is handled in a very masterly style, which does infinite credit to the acumen of the author. "Let us inquire (says he) what evidence the advocates of waste have to advance in support of their hypothesis. How do the debris of the system escape from it? Not by the lungs; because no atom escapes thence but what is furnished by the food; not from the kidneys; because every particle of that secretion is furnished by the food: and from all other sources the quantity is inappreciable; and, even though inappreciable, is needed to explain the manner in which a portion of the food is expended. But then, they may affirm, that all the matter carried off in the way just mentioned is but the ruins of the animal structure; and that the elements of food go to repair the damage thus sustained—a hypothesis which is a slander upon nature, and, as we shall shortly see, quite repugnant to principles of science. These theorists say that the carbon emitted from the lungs is abstracted from venous blood; which they contend is loaded with that substance." If this be so, whence is it derived? if from the *debris* of the system, how does it get into the veins? inasmuch as the venous blood has got all its carbon before the lymphatics unite with the thoracic duct, it being the apparent function of the absorbents to remove the debris of the system, and they only join the subclavian immediately before the united contents are poured into the heart; if these vessels too contained the redundant carbon, why is the fluid in them not black? But in addition to all this, we have only to look to the admitted fact, that the moment we eat, a greater quantity of oxygen is consumed, and a greater quantity of carbon thrown off; and how, we ask, could this be explained by the old 'theories? yet it is easily explicable by that promulgated by Mr Grisenthwaite.

The author next turns to the consideration of the growth of the body, and the quantity of food requisite for this purpose. And in order that facts may be more explicit, and brought with something like mathematical accuracy before the reader, he first considers the growth of the *fœtus in utero*. After a few preliminary remarks on the average weight of the child at birth, he rates it at nine pounds, and, for the better illustration of his argument, supposes its growth to be uniform, so that " one pound is produced every month, or four-sevenths of an ounce per diem,—a fraction more than *half an ounce daily!*" Now it is notorious that pregnant women do generally and purposely take more food than at other times, and in spite of this, it is also matter of common observation, that during that period they become more or less emaciated. Now the excess of food beyond that required for the purposes of respiration, the author shows, is more than sufficient to account for the small increase which is required at this time, seeing it amounts to only half an ounce a-day.

The author also notices the growth to the perfect stature, say about one hundred and forty pounds; and as these are formed in certainly not less than twenty years, it will give about *seven pounds of yearly increase*, a quantity considerably less than that required for the formation of the fœtus in nine months.

Mr Grisenthwaite next considers a few instances of waste during disease, and compares the phenomena observed in them with his theory. He instances the effects of a slight rheum, of fever, of diarrhœa, or a stoppage in the supply of food. In speaking of fever, he remarks, that " a fever actually wastes the body by abstracting an excess of carbon from the blood. At such times more blood passes through the lungs to be decarbonized than the stomach can furnish by digestion. The effect is soon visible.

Even if the appetite and digestion were in no degree impaired, waste must happen, because more is taken away than is supplied. One hundred and forty pulsations in a minute will occasion an expenditure of *double* the quantity of carbon in the same time that takes place in health; or consume daily as much of the substance of the system as is equal to about two pounds of bread, and thirteen ounces of meat. That this really happens is proved by the *increased temperature* of the body, for which we have framed a particular designation, and call it fever heat."

The author takes occasion to mention, as an additional argument in favour of his theory, that instead of waste increasing with increase of temperature, it actually diminishes; and he quotes Lavoisier's experiment as to the relative quantities of oxygen consumed at the temperatures of 54° and 79°; at the former 1344 cubic inches of oxygen being consumed, and at the latter or high temperature only 1210. Now, as air expands 1.480th of its volume for every additional degree of temperature, there would be an augmentation of its volume to a nineteenth part; and as a nineteenth of 1344 is equal to about 70 cubic inches, this will leave 1274 cubic inches to be expended at the high temperature. But as the respiration always becomes more languid at a high temperature, the difference between the actual result of Lavoisier's experiment and the author's reasoning may be easily accounted for.

From the fact now stated, the author explains the circumstance of the Coolies in India being able to live on a quantity of food barely sufficient to account for the loss of carbon by respiration, that is supposing they lost eleven ounces and a half of carbon in the twenty-four hours. But, as we have already remarked, this assumed loss of eleven and a half ounces of carbon daily is certainly far above what usually occurs; for, as the author remarks, and we have frequently noticed the same thing, instead of 20 respirations in a minute, 14 appears to be the usual number for a man in health, so that if we subtract a third from this eleven and a half of carbon, we shall probably be much nearer the truth than at present, besides that, during sleep, the average number of inspirations in the minute is much lower, probably not more than eight or ten.

This will enable us better to understand how Cornaro could subsist on *twelve ounces* of solid food daily, and tallies well with the ascertained fact, that the inhabitants of warm countries require a quantity of food vastly less than those inhabiting colder regions.

Having thus shown how the food is disposed of, the author comes to perhaps the most important part of his essay, that is the theory of the *source of animal heat.* He combats with great ability the old doctrines or rather suppositions regarding the source of animal heat; suppositions at which physiologists grasped, apparently for no other reason than that they knew nothing of the matter, and considered any explanation as better than none. They certainly show the influence of a name in promulgating a theory, however absurd; and it is perhaps for no other reason, that this unpretending volume of Mr Grisenthwaite has been condemned without a hearing, by those from whom a more impartial judgment should have been expected.

We prefer giving the author's theory in his own words: "We have seen, in a former part of this essay, that eleven ounces and a half of carbon, enter into combination with oxygen, during every twenty-four hours' respiration; or almost thirteen grains every three minutes and a half; during which time thirty-three pounds of blood have passed through the lungs. Now thirteen grains of carbon—as is well known to those acquainted with the generation of steam—would, on combustion, or combination with oxygen to form carbonic acid gas, convert one hundred and four grains of water, at 212°, into vapour. This, according to Buchanan, takes place in a well-arranged furnace and boiler. We may, therefore, safely consider, that quite one hundred and forty grains of vapour, at least, would be formed, if no heat were lost by radiation; and in the lungs none is so lost. To this must be added the heat contained in the air which supports ordinary combustion, amounting to ten pounds for every pound of coal consumed; all of which escape at 300° or 400° of temperature; sometimes considerably higher, as appears by the spontaneous combustion of the carburetted hydrogen, and carbonic oxide at the top of steam engine chimnies. Here, then, we have one hundred and forty grains of steam, containing a thousand degrees of latent heat, or as much as would raise one pound and a half of water fourteen degrees and a half, or thirty-three pounds of water *about* three-quarters of a degree; allowing no part to be lost in the air respired; which is inconsiderable. Now supposing the blood to have the same capacity for caloric as water —which is very near the truth—then we perceive, that the thirty-three pounds of blood will acquire an increment of temperature, every three minutes and a half, amounting to *three quarters of a degree.* How needless the fears of Black, Dumas, &c. that the lungs would be injured by combustion!—that the heat 'necessaire pour echauffer le corps, irait a *detruire la substance des parties qui en seraient le foyer.*' How surprizingly does a little calculation dissipate hasty conclusions!"—Pp. 73, 75.

The merit of these views consists in their simplicity and their perfect accordance with scientific and especially correct chemical principles. The rapidity of the circulation prevents the blood from being cooled down too low, whilst the small increment of temperature it receives at the lungs is quite sufficient to satisfy the wants of the animal economy.

This ingenious hypothesis throws, on the uses of circulation, a light hitherto unknown, and ought to have the effect of directing the attention of physiologists and chemists more immediately and deliberately to the consideration of the views here given, than has hitherto been the case. What an absurd supposition was it, that seventy-three gallons of blood must rush like a torrent through the body every hour, to carry away *less than five grains* of matter ! or that more than twelve hundred gallons should be required to supply the daily *waste* of the system.

But the author next proceeds in the same logical manner to inquire "whether these three-quarters of a degree, imparted to the blood in the lungs, be sufficient to explain the cause of animal heat, and to account for the continual loss of it from the body." Now the capacity of animal fibre for caloric is nearly .75,—that of water and blood being nearly equal, so that every degree of temperature in the blood will give one and a third of a degree to muscle ; "so that in three and a half minutes thirty-three pounds of muscle would receive one degree of heat—and in about fifteen minutes a body of about one hundred and forty pounds weight would receive the same increment, or in round numbers four degrees every hour. He then refers to the length of time a body suddenly deprived of life takes to cool ; but the chief and most important proof is taken from an experiment performed on himself. He immersed his hands in water, and observed the rise of temperature in a given time, and also the period when the rise of temperature ceased,—the cooling from evaporation at the surface, and the additional heat from the hands balancing each other. By the usual calculations, which he gives at length, he found that the results very accurately corresponded with the theoretical conclusions to which he had previously arrived. This likewise goes to prove that the calculations of the daily loss of carbon are much higher, at least one-third, than what actually occurs ; and tends still more strongly to prove the author's conclusions to be correct.

A few of the objections which might be urged against his theory are answered, and the author shows how correctly the fact of hybernation is explained by his theory. He also adds further observations on the absurdity of the doctrine of waste ; and shows that the nitrogen contained in the animal body is not necessarily drawn from the food, but from the atmosphere ; and that the loss of nitrogen in the respired air in the experiments of Allen and Pepys, Berthollet and Bostock, is not only more than sufficient to account for all the nitrogen in the body of a man, but that it would more than supply that in the body of an ox !

The author then makes a very few passing remarks on animal electricity, in elucidating which interesting department, we hope he will be equally successful with the present ; and he concludes with a clear and forcible statement of the advantages of temperance and moderation, in the case of himself and that of his own family, which, for its truth and correctness, deserves the particular attention of all persons, professional and unprofessional.

We have seldom perused a work with more pleasure than we have done this little volume of Mr Grisenthwaite. We have only to hope that he will not stop his inquiries here, but that, as he has already with such success unfolded some of the arcana of nature, he will continue his researches, and invest them with that degree of certainty which will fix the whole theory on a solid basis.

ART. III.—*Medical Notes and Reflections.* By HENRY HOLLAND, M.D. F.R.S., &c. Fellow of the Royal College of Physicians, and Physician Extraordinary to the Queen. 8vo. London, 1839. Pp. vii. and 628.

THE present work comes forward under circumstances of a somewhat novel and peculiar character. It is the production of a physician of large and high practice, who has been in the habit of preserving notices of particular cases, and of putting down such reflections in respect to the nature and treatment of disease, and to subjects connected with his professional avocations, as from time to time presented themselves.

On looking over, after a lapse of several years, the materials thus collected, the author has considered that a certain portion of them "might be likely to contribute, in some degree, to medical knowledge, or to the exactness of our views in practice;" and he, therefore, offers them to the public, not as possessing much claims to originality, or as bringing forward remarks or illustrations which are not familiar to all "who have carried observation and study into their medical life," but as affording aid to other methods of research, and having a tendency to enlarge the general amount of medical knowledge.

In following up the views which he thus professes, Dr Holland exhibits the possession of a judicious, candid, and philosophical mind, with much power of observation, and a ready appreciation of the proper modes of prosecuting medical inquiries; but though he appears to have well employed the large opportunities of private practice which he has enjoyed, he would have been much benefited in his views to inference and deduction, by an early and extensive acquaintance with the practice of hospitals. It is true, that, as far as personal improvement goes, the habit of observing well a small number of cases, prepares the mind of a physician for the gradual expansion of his practice into full occupation; but it can never supply an adequate familiarity with the varied forms of the more serious diseases, nor give the readiness of apprehension and deduction, which is communicated by a long and unceremonious acquaintance with the diseases of the poorer orders of society.

Dr Holland, indeed, adverts to one part of the difficulties attendant on very full professional employment, when he speaks of the production of scepticism in questions of medical evidence under such circumstances. " Sometimes," says he, " this occurs in effect of a temperament of mind (not uncommon among thinking men) which is disposed to see all things under doubt and distrust. There are other cases, where the same feeling, not originally present, grows upon the mind of physicians, who have been too deeply immersed in the details of practice. The hurried passage from one patient to another precludes that close observation, which alone can justify, except under especial circumstances, the use of new remedies, or active methods of treatment. From conscience, as well as convenience, they come to confine themselves to what is safe, or absolutely necessary; and thus is engendered, by degrees, a distrust of all that lies beyond this limit."

This is a candid and honourable, and, we believe, a very faithful picture of the state of mind, which very large, constant, and laborious professional occupation is apt to produce. We consider it as unfavourable to improvement, and as hardly compatible with that accuracy of discrimination, which is one of the most important attributes of the scientific practitioner. A well employed lawyer has every description of collateral aid; and it only remains for him to make the best use which he can, of materials which are principally provided for him by his juniors or other coadjutors; and it would, perhaps, be most favourable to the well doing of a patient, and most satisfactory to the feelings of the physician, if he were, at a certain period of life, or amount of employment, to confine his attention to cases in which he had the benefit of communicating with a colleague, who could give due attention to their details, and thus relieve him from the most onerous and embarrassing part of his responsibility. Dr Baillie was the only physician, as far as we know, who attempted to act upon this principle; but we know not how far the public are prepared for such a division of duty.

In the estimate which we form of the advantage of hospital practice to a physician, it is not, however, to be denied, that, in the course of time, a dull routine is often the consequence of continuing to see great numbers of patients when the energy of life is somewhat diminished; more particularly if there is no considerable attachment to pathological inquiries; and no attendance of pupils to keep up the mettle of the practitioner.

From the great variety of topics which occur in the work before us, and the desultory manner in which they are necessarily treated, it will be impossible for us to give any thing like a minute analysis of its contents. We have derived much pleasure, both from the information communicated in these essays, and from being admitted, through them, to an acquaintance with the turn of thought, and the habits of observation and inquiry, of a learned and able physician, who, very early in life, became creditably known to the world, by his interesting travels, and by his manly and honourable deportment during a very delicate public investigation. We venture, however, to express our doubts, how far a publication like the present, which, as the author says, must contain so much that is familiar to medical men of study and observation, is urgently called for. A great number of physicians, as well as individuals of every other class of society, are able, without much effort, to bring forward, on a great variety of subjects, valuable facts and judicious opinions; and yet it would be attended with some inconvenience, if the principle of carrying such facts and observations before the public, as separate and distinct works, were very extensively acted upon. Contributions to general science are usually made to the transactions of scientific bodies; and such, we are of opinion, would be a very appropriate channel for most of the essays and observations which derive their materials from the occasional and diversified entries of a common place-book.

The first chapter is on the subject of *Medical Evidence*, and in this the author points out, in a very lucid and correct manner, the peculiar difficulties which attend the cultivation of medicine as a science, and the numerous sources of error which attach to it; among which he mentions *idiosyncrasies*, as the most " absolute and inevitable." He adverts to the proneness of mankind to be deceived by imposture; and the insufficient proofs which medical men are themselves very apt to require, in forming their conclusions as to particular modes of treatment. He states having known during the last twenty years, " the rise and decline of five or six fashions in medical doctrine or treatment; some of them affecting the name of systems; and all deriving too much support from credulity, or other causes, even among medical men themselves."

He is of opinion that similar difficulties attach to medical doctrine and theory; and adduces, as striking examples of this, the history of fever, and of contagious diseases generally; and the states of the capillaries in inflammation. The application of numerical methods and averages to the history of disease, he regards as a very important means of improvement; and thinks that, through medical statistics, lies the most secure path to the philosophy of medicine.

The second chapter is on *Hereditary Disease*. The established proposition, " that all original, or connate bodily peculiarities, tend to become hereditary; while changes in the organic structure of the individual, from external causes, during life, end with him, and have no obvious influence on his progeny," bears much on the subject of hereditary temperament and tendency to disease. Every organ and texture of the body is capable of variation; so that though the transmission of likenesses and peculiarities from parents to offspring, are a general law in the animal creation, still the deviations are so considerable, as to make the "permanence of type of our species," almost a matter of doubt, did not the Author of Nature set limits to changes of conformation. Notwithstanding the admission of such limitation, however, he allows the "*possibility*," with the followers of Geoffroy St Hilaire, "that it may be otherwise; and that research may hereafter disclose to us some evidence that species are not immutable."

We must be allowed to doubt, however, the correctness of this reasoning: for if the laws consist in generalization from facts, we are not warranted in hesitating to acknowledge them, on an imaginary contingency, that certain other facts not known to exist, may in future be found to exhibit themselves. An important confirmation of this law is found in the disposition, to which the author adverts, of individuals of the same species, never losing their relation "to the original common type;" but, on the other hand, "tending ever to recur to it, when the causes of change are modified or withdrawn." The solids, as well as the fluids, seem to the author to be implicated in the transmission of hereditary peculiarities; the internal as well as the external organs; and while some of those peculiarities may affect, in no important way, the health or natural functions, others may produce morbid actions "painful in progress, and fatal in result." It does not appear to the author, that there is any greater disproportion between the transmission of malformations in the organic, than the animal life; but in both of them, congenital deviations are often carried to great minuteness, of which the author gives several examples.

"An instance is known to me, says he, of hydrocele occurring in three out of four successive generations, in one family,—the omission adding to the singularity of the facts, from its depending on a female being the third in the series, in whose son the complaint reappeared. I am acquainted with a family, in which there are three examples, the father and two children, of inability to distinguish red as a colour. Another example resembling the last is known to me, where three brothers, and two or three children of their families have the inability to distinguish between blue and pink. Instances of this kind as an hereditary defect are far from unfrequent. I have known squinting to occur in every one of five children, where both parents had this defect. The repetition of cases of deaf and dumb children in the same family, is well known to those who are concerned in institutions for the relief of this congenital defect. An example has recently occurred to me, of that remarkable affection, the *suffusio dimidians*, existing in a father and his daughter; and brought on in each by circumstances singularly alike. In another family, I have seen several instances of the peculiar *tremor tendinum* of the hands and arms, which is sometimes called the shaking palsy; and which here occurred in young persons of sixteen or eighteen, as well as in those more advanced in life. In this case, too, I had proof of the peculiarity having gone through at least three generations. Similarity in the form and setting of the teeth, as well as in the colour of the hair, is often observed between parents and children: and left handedness, from whatever this proceeds, sometimes takes the character of a family peculiarity. In a family where the father had a singular elongation of the upper eyelid, seven or eight children were born with the same deformity, two or three other children having it not. In like manner I have seen enlarged tonsils occurring in almost every individual of a numerous family, without other cause by which to explain it."

The disposition to eneuresis is often hereditary; so is that to emphysema of the lungs and hæmorrhages. Goitre, plica polonica, calculous complaints, and *trismus nascentium* afford similar examples; and with regard to the last named disease, the author states, that in the Vestmann Islands of Iceland, where the whole population did not exceed 160, 186 infants, or about 4.7 per annum perished of this disease, in the period of twenty-five years, under the age of twenty-one days, without there being any obvious circumstances of habits or modes of life to account for the peculiarity. Some intances are mentioned by the author, of a family tendency to paralysis, epilepsy, diabetes mellitus, diseases of the heart, and spasmodic asthma. But among the deaf and dumb, though examples often occur of two or three cases in the same family, yet this seems to be independent of any previous disposition to the disease in either of the parents. At the school for the deaf and dumb in Manchester, there were, in the year 1837, 48 cases taken from 17 families, whose children amounted to 107 in number, making nearly three such cases in each family; but in one case only was the disease known to exist in either parent. The author adds his personal knowledge of an important fact, namely, that, in a case where the parents were both of them deaf and dumb, the children were themselves free from that defect. Short-sightedness has been known to occur in almost every individual of a large family, without either parent being similarly affected. Gout, scrofula, and rheumatism afford many difficulties in their pathology, though the hereditary disposition to those complaints is often unequivocal. In scrofula similar forms of tendency often exhibit themselves in the same branch of a family; as affections of the eyes, of the joints, or of the lungs, constituting the common form of pulmonary consumption. Diseases of the skin sometimes assume a hereditary character, and this is the case likewise with the Pellagra of Lombardy, of which the author published an excellent account in the eighth volume of the Medico-Chirurgical Transactions many years since.

The hereditary tendency of disorders of the brain and nervous system, lead the author to the consideration of that disposition to insanity which occurs in particular families, and even in districts and communities. In all these cases, he concludes, that there is a deviation in physical structure; and that in no other way can we conceive the transmission of a tendency from one generation to another to take place.

Much similarity, with regard to the severity of particular symptoms, occurs in the same family; and the most striking analogies in this respect have occurred to the author, where the external resemblance has been most considerable.

The third chapter treats of *Bleeding in affections of the Brain*. In this chapter, the author adverts to the various circumstances and states of brain under which affections of that organ, and paralysis in particular, may arise; and is of opinion that the practice in those complaints is too much directed by the " vague conception," that they depend upon some inflammation or pressure which it is needful to remove, Diminished nervous power may often give rise to paralysis and various spasmodic seizures, to which great depletion would be highly unfavourable; and with regard to delirium, throbbing, and vertigo, they may occur after hemorrhage; or be the consequence of loss of power after starvation, as in cases of shipwreck. When the two vertebral arteries were tied by Sir Astley Cooper, the brain was suddenly and largely deprived of blood; and hence arose various forms of paralytic as well as spasmodic affections, which bleeding is so often erroneously employed to obviate or relieve. The subject is one of great importance; and it is quite clear, that the ultimate cause of paralysis, and of many of the affections of the sensorium, is a change in the production, or propagation of nervous energy, of which pressure is very far from being the sole cause.

Chapter fourth is on *Sudorific Medicines.*—The production of perspiration by artificial means, rarely corresponds, in the degree of benefit arising from it, with that occurring from natural causes. Exhalation from the skin may be viewed either as a cause, or as an effect of a favourable change in circumstances of health; and as it so very often happens to a large extent without producing any beneficial effect, as in continued and hectic fevers, pneumonia, and acute rheumatism, we are to look to other concomitants for its favourable operation. An attempt to force perspiration is often of doubtful benefit; and the circumstances under which the most distinguished sudorifics, as antimonials and opium, most frequently do good, are by reducing vascular action, and thus favouring the spontaneous occurrence of diaphoresis. The following is the summary of the author's opinions on this subject.

First, that it is more reasonable, as well as beneficial in practice, to have regard to the changes in the circulation producing diaphoresis, than to the action of sweating itself; and secondly, that the amount of perspiration is rarely a just measure of the good obtained, and that to make this a primary object, is likely to give a wrong and injurious bias to the treatment of disease.

The next chapter is on the *effects of Mental attention on Bodily organs*.—The author would rather term this *the direction of unconsciousness* than simply attention; and he gives examples of the effects of such direction on various bodily functions, as respiration, digestion, and circulation; on the salivary glands; on touch and feeling, and on some of the secretory and particularly the urinary organs. Chorea, hysteria, and asthma afford examples of a similar kind; and their phenomena seem to depend on some unknown attribute of the nerves; a fact which the author considers as confirmed by the circumstance of the peculiar relation of the mind to the bodily organ, being not alike, or equal in degree in all parts, but existing in some proportion to nervous sensibility, and perhaps to vascularity, in the healthy state.

Chapter sixth is *on points where a patient may judge for himself*.—These are 1. *temperature*, in which a patient's own feelings, which, except in cases of vitiated sensation from nervous disease, form the best criterion to follow. 2. *Food and drink* for "the stomach of the patient becomes a valuable guide" in relation to its wants, particularly when it prescribes the *tempestiva abstinentia*, against which it is seldom wholesome to contend, notwithstanding the mistaken importunities, with which the practitioner and patient may be surrounded. Even extravagancies of diet, the author thinks, may often be indulged, inasmuch as the wish for them may depend on some mysterious law to effect changes in the whole mass of blood; for, in relation to systems, the author following up this palateable doctrine, is of opinion "that dietetics must become a much more exact branch of knowledge, before we can be justified in opposing its maxims to the natural and repeated suggestions of the stomach, in a state either of health or disease." With regard to *exertions of body*, the feelings of the patient are generally the best guides, except in the cases of mental exertion during illness or convalescence; for "the present condition of life among the higher classes produces as much of evil, from excesses of moral and intellectual excitement, as from those of the stomach." Last of all, the kind of medicine exhibited, or whether medicines may be given at all, are circumstances concerning which a prudent physician may often be instructed by the feelings of his patient.

Chapter seventh *is on the connection of certain diseases.*—The diseases to which the author here more particularly refers, are those of a contagious or epidemic character; as scarlatina, measles, hooping cough, erysipelas, the infantile fever, dysentery, and influenza; and he is of opinion, from various phenomena which he has had occasion to remark during the progress of those complaints, that there are some relations among them, which have not yet been sufficiently ascertained. Measles and scarlatina were considered by Morton as varieties of the same complaint; and those diseases are often singularly concurrent with hooping-cough and infantile fever, in particular districts, and about the same periods; while, at the same time, it is not uncommon to find one of those disorders prevalent in one locality, and another equally so in a contiguous one. During the existence of some of the recent influenzas, scarlatina and measles were very prevalent; and there were occasionally cases of a mixed and anomalous kind, which seemed to favour the idea of a concurrent action of two morbid causes. Erysipelas and erythematous inflammations and puerperal fever often exhibit themselves at the same time; hooping-cough is often coexistent with influenza and infantile remittent fever; and the connection of symptoms between that and the last named complaint (which the author is disposed to consider as frequently possessing a contagious character) seems to him to point to some common or similar cause, modified in its operation. The author deems it likewise probable "that the disorders already mentioned, incidental chiefly to childhood, have virtual identity with certain fevers, or other diseases of adult age; the operation of the causes varying according to circumstances, of which difference of age may readily be admitted as the chief. Dysentery will here suggest itself as one of these kindred disorders. It has various relations to the infantile fever, in the course of the symptoms, in the textures affected, and in the morbid lesions consequent upon it, and perhaps no differences beyond what are compatible with a common cause, acting under different conditions. It is further worthy of remark, in pursuing these series or circle of relations, that dysenteric symptoms are generally frequent at the same period as the diseases first mentioned, as well as during the seasons when the influenza has appeared in its most severe epidemic form." The connection between dysenteries and pestilential diseases has often been noticed; and the author likewise directs the attention to the singular analogy, to the milder forms of typhus and of intermittents, which the epidemics now principally noticed by him have occasionally presented. He is of opinion that there is a close and important relation between typhous fever and the exanthemata; and that there are certain symptoms in common, which justify the belief of a community of origin. Too much attention has, he thinks, been paid to the eruptive characters of a complaint, as indicative of its real nature and character; for the eruption is not to be considered as itself the disorder, but one only, "and that not always the most critical of the series of changes composing it."

The eighth chapter is *on the abuse of Purgative Medicines.*—The use of medicines of this class the author considers as being carried much too far by English practitioners; and he refers the introduction of this habit to the influence of two or three esteemed authorities; to the success of the antiphlogistic treatment, of which purgatives form an important part in certain complaints which had been dealt with otherwise. Daily evacuations are not invariably to be required; and when there is torpor of the intestinal canal, the irritation of strong and frequent medicine is to be avoided; while the admission of patients, that they are often better on the days when no evacuation takes place, is not to be overlooked in practice. Gastric fevers and other fevers in their early stages require the full use of purgatives, notwithstanding the dictum of Hippocrates on the subject*; though emetics, the author is of opinion, should precede them. The author adverts to the cases in which full purging is required, and to those in which the combination of tonics, with aperients, have an excellent effect; but we are surprized that he does not mention the occasional benefit derived from injections, as tending, with as little irritation as possible, to produce evacuations, more particularly as Celsus, whose authority he so deservedly values, and whom he is rather anxious, as with the other medical classics, to have on his side, says of them, "*Plerumque vero alvus lotionibus ducenda est.*"

Chapter ninth *is on methods of Prescription.*—In this chapter are contained some very judicious remarks on the mode of communicating with the sick and their friends; and on the most important points to be attended to, in directing the treatment of the sick. "It is a frequent error," says the author, "in young practitioners, to allow themselves to be betrayed into hasty diagnosis or prognosis of disease, either by their own nervousness or, by the importunity of the patient, and those around him. The fault is serious; not merely as a source of embarrassment, but often by impairing integrity in practice, from the desire to redeem a wrong opinion thus given. It concerns greatly the reputation and usefulness of the profession that every caution should be exercised on this point. Forbearance in words, till the judgment is well decided, is therefore in some sort a duty as well as an act of prudence." But then it unfortunately happens, that the patient or his friends are dissatisfied without a decided opinion in the first instance; and hence a dangerous rapidity of judgment is encouraged, which is exceedingly unfavourable to accurate and dispassionate investigation.. A lawyer is allowed time to investigate a case thoroughly, before he is pledged to an opinion in respect to it; but the physician has the continual temptation before him, of offering an opinion on an early, and perhaps imperfect view of the case. It would be well that the practice which is so often observed of giving names to diseases in hospitals, on the admission of patients, were uniformly deferred, till there was an opportunity obtained of a more intimate acquaintance with their nature and symptoms, than can take place during the hurried period of admission. A physician of reputation and standing likewise, who can well afford to be considered as sometimes hesitating about the nature and nomenclature of a malady, would benefit the public and the profession, if he were occasionally to forget the eclat, which decision, the attribute so much misunderstood, and so improperly lauded, so often confers, and endeavour to produce among the public the habit of expecting that time for thought and deliberation will be required by every man of real judgment and talents, before he is justified in giving a decided opinion on the nature of an important case.

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* Ἐν τοῖσιν ὀξέσι πάθεσιν ὀλιγάκις, καὶ ἐν ἀρχῇσι τῇσι φαρμακείῃσι χρέεσθαι.

The tenth Chapter is *on Gout and the use of Colchicum.*—With regard to the nature of gout, the author is of opinion, that it has a material cause, " formed and circulating in the system, and eliminated from it by the gouty fit, or in other ways;" that it is a complaint of the general habit, with the peculiar faculty of being relieved, for a time, by the occurrence of a fit; that in the great majority of cases it is a hereditary disease, in which there is a tendency " to form or accumulate the matter of the disease in the system;" and that the fit of gout is but " a local declaration of the disorder of the whole habit, or more especially of the circulating fluids." The rapid translations and shifting of gout, which form so peculiar a character of it, have been attributed by some to the agency of the organic nerves; but the author sees no difficulty in supposing these phenomena to be produced through the *blood*, " seeing the rapidity with which other changes, indisputably occurring through this medium, are effected."

The author alludes to the difficulties which there are in accounting for the occasional occurrence of a fit of gout, without previous warning; and to its seldom coming on before the age of thirty-five; but he considers that the gouty diathesis is not absent in females, because it does not show itself in the usual recognized shape.

The usual limitation of gout to the wine drinking part of society, is partly to be accounted for by this being the particular class in which the hereditary disposition is most commonly shown. It sometimes appears to be connected with the amount of animal food used in diet; but in both cases, the author is disposed to attribute the occurrence of the disease rather to deficient action of the excretery organs than to faulty assimilation. The chief influence of wine, he considers as altering the secretion of the kidneys, though part of it may consist in engendering the materials of the disease. The author sees a prospect, from the course of recent research, that the cause of gout will be found, not in the existence of any matter alien to the system, but in the superabundant formation, or undue retention in the blood, of some material which, to a certain extent, is necessary to the health of the body, as perhaps lithic acid.

The author considers gout as having an intimate relation with headach, ophthalmia, and bronchitis; with asthma and hypochondriasis, and with diseases of the liver; but, most of all, with the urinary organs, from which he is disposed to infer, that the existence of lithic acid and its compounds may have an important connection with the production of the disease.

The operation of *colchicum* in gout, the author is disposed to consider of a *specific* kind, since it is not only advantageous in the recent and more severe cases, but in the chronic forms of constitutional disease; and he is of opinion, that this specific influence may be exercised in an important degree through the medium of the kidneys. He does not regard colchicum when judiciously employed as having any tendency to render the attacks of the disease more frequent; and, on the other hand, views it as being with due care made a preventive as well as a curative of gout. He considers the acetous extract as upon the whole the best preparation, and when it is used for the purpose of removing the local inflammation it should be united with purgatives.

Chapter ninth is *on some supposed diseases of the Spine.*—Spinal complaints occur mostly among females; but there is much misconception in relation to them, as they are frequently connected with a nervous or hysterical state of the constitution, without local affection; and are best relieved by remedies which bear no relation to the spine. In ambiguous cases leeches are preferable, either to issues or blisters, which often have a tendency to aggravate the symptoms which they were intended to relieve. Opium is an important remedy in such cases.

Chapter twelfth, *On the Brain as a double organ.*—" Paralytic affections, whether of the organs of sense or of voluntary motion, are the most distinct and familiar examples of morbid results connected with this doubleness of structure." The relation of the two eyes in natural vision, and under disease, offer also some curious evidence on this subject; and in the singular phenomena of *suffusio dimidians*, when one-half the field of vision only is perceived by the mind; in hemicrania; in the occurrence of perspiration only in one side of the body, and the more powerful operation of blisters, on one side than the other; in the difference of sensibility of the two sides of the body; in the disparity of power in the use of the two arms, and in the great majority of cases of malformation occurring on the left side of the body, (a circumstance which is stated by Meckel, and confirmed by the author,) are to be seen variations in the two hemispheres, and perhaps in the system of the spinal chord itself. Whether double structure may give rise to incongruous action, in aberrations of mind, is an important question; but in this case it is likely, the author thinks, that they are never simultaneous; though diversified trains of thought may follow each other with inconceivable rapidity, much greater than we have reason to suppose can be recognized by language, or in our common contemplation of the subject.

Chapter thirteenth, *On some points in the Pathology of the Colon.*—The author considers the colon as possessing important powers of exudation or secretion, and as ordinarily giving rise to many of those affections which are so constantly referred to the stomach, duodenum, or kidneys.

In considering what indications are afforded by the appearance of the tongue in reference to the state of the colon, the author gives us, in a note, the following deductions, as to the appearance of that organ in general disease. "Among the external indices of change within the body, the tongue is perhaps the most valuable. Constantly as it is referred to in practice, we are still only partially informed of all the diagnostic marks it affords. Scarcely can the pulse compare with it in the extent, variety, and accuracy of these indications which are not limited to disorders of the membranes and secretions of the alimentary canal, or to the presence of fever in its several forms, but extend also to the nervous power of various states of which it affords very correct evidence. The sensibility, the voluntary powers, and even the more intellectual functions, are often exactly thus interpreted. No one can doubt this who is familiar with the appearance of the tongue under great debility; slowly and with difficulty put out of the mouth; withdrawn with equal effort; tremulous the whole time; its surface parched from stoppage of all secretions; its sensations blunted or depraved. There are various parts of morbid anatomy which less merit the care bestowed on their representation than do the disordered states of this organ. The fugitive nature of the appearances, and their less fixed relation to disease from the variety of parts they represent, are the obstacles here. But the opinion may be repeated, that the physician cannot better study any set of signs, than those afforded by the tongue, the palate, and fauces; the terminating portions of that inner surface along which so many actions are carried on both of health and disease."—P. 182.

Chapter fourteenth, *On the Epidemic Influenzas of late years.*—In adverting to the circumstances attendant on the influenzas which have presented themselves during the present century, or have been recorded by Sydenham, and the principal medical writers since his time, the author is led to the conclusion, that there are no known circumstances of atmosphere which can account for their appearance. " The obvious conditions of weather being the same in a certain number of places, the disease appears in them at very different times, or in some not at all;" and " occurs in various places, or in different years at the same place, under states of season and weather opposed to each other."

The evidence is likewise unfavourable to the supposition, that such epidemics are occasioned by " terrestrial influence, an undefined agency, proceeding from an unknown source within the earth itself." That they are dependent on some specific virus, as is the case with scarlatina and measles, the author considers probable; and though there is no distinct proof of the communication of infection from one person to another, yet there are some presumptions that such may be the case. The matter of the disease may, like that of various other epidemics, be dormant for some time, and then suddenly exhibit itself; and the disposition to recurrence may, when the attack has been severe, last for many months. Prostration of strength, and depression of mental functions and feelings, are remarkable attendants on influenza; and a seeming severity of local inflammation is coexistent with a state of debility to which the ordinary remedies for inflammation are very inappropriate.

In the treatment of influenza, " the officiousness of active practice is often a source of much mischief;" and the majority of cases require rather the forbearance of the physician, than the strenuous use of active remedies." Antiphlogistic remedies, and particularly blood-letting, are to be employed with great caution; and most advantage, in the author's experience, has been derived from the use of bark or the sulphate of quinine, which, though not given at the commencement of the disease, may be exhibited in many cases where there is still hard cough, particularly of an intermittent character, with pain, oppression, and restlessness, which are often accompanied with soft feeble pulse, and moist skin.

Chapter fifteenth, *On Dreaming*, *Insanity*, *Intoxication*, *&c.*—" A dream put into action (as in fact it is, under certain conditions of somnambulism) might make madness in one or other of its most frequent forms; and, conversely, insanity may often with fitness be called a waking and active dream. Delirium and intoxication may be considered transient effects, from temporary causes, of that condition of sensorium which, more deeply fixed and longer continued, obtains the name and produces all the aspects of mental derangement. The sudden change of habitual judgments, feelings, or actions, without any obvious cause," seems to the author to be one of the best practical tests of insanity; and the most correct description of this disease, he thinks, "would be found in the conditions which most associate it with dreaming, namely, the loss, partial or complete, of power to distinguish between unreal images created within the sensorium, and the actual perceptions drawn from the external senses; thereby giving to the former the semblance and influence of realities;—and, secondly, the alteration or suspension of that faculty of mind by which we arrange and combine the perceptions and thoughts successively coming before us."—P. 216.

Many modifications are produced in the relations between dreaming and insanity by the varying degree of exclusion of sensations from without; which in the former is much more complete than in the latter. Spectral illusions are much connected with the subject, and give rise to many useful and interesting observations. They may come unbidden into the mind, and dominate alike over the senses and reason; or they may be introduced by volition in either case; but without the power of being removed by voluntary effort. They may thus produce a struggle with actual impressions on the senses, and in this way give rise to various diversities of form, from the "simple recovery of the absent man, to the wildest incongruities of the maniac."

Sight and hearing are the most fruitful sources of spectral illusions; but the latter also occur with the senses of touch, taste, and smell, and thus afford a certain degree of foundation for many modes of insanity, in a natural law of our constitution. The ready occurrence of confused ideas and images when the eyes are shut, and waking consciousness still retained, is an imperfect state of dreaming; but, if this can be supposed to arise from other causes, and to leave free the action of the external senses, and power of volition, such a condition would be hardly distinguishable from many forms of mental derangement. The ramblings and transitions of the waking state, when the mind is not bound down to any one subject, are often scarcely less singular and abrupt than in dreaming, and the associations with which they are connected, hardly less traceable.

In extreme old age, "the phenomena of dreaming and waking aberration," are closely blended together, so as to make life a sort of vague and feeble " dream ;" and in reverie, trance, and catalepsy, it would seem that, though the external senses are closed, the intellectual and moral powers go on. But in trance, the sense of touch appears to be most especially affected, so as to make the body insensible to even considerable stimuli. The nervous substance of the brain seems to be the source of many of the phenomena which have been adverted to, and the various alterations of structure which have been discovered by pathologists, in cases of mental derangement, seems to the author to be causes affecting this portion of that organ.

Chapter sixteenth is *on Mercurial Medicines.*—The admixture of calomel or blue pill, with other purgatives, the author considers as usually injudicious ; and when mercurials are administered for their general effects, a combination with tonics is often useful. To mercurials is often attributed action on the liver, which he regards as due to an influence on the mucous membrane and glandular follicles of the intestines ; and their efficacy in acute inflammations of serous membranes, the author ascribes to an operation on the capillary vessels. He thinks that calomel is too much given as a purgative, and too little for its constitutional effects ; and he considers the oxymuriate as a valuable and safe preparation of mercury, particularly in combination with tonics, and has known its long continued use very beneficial in certain cerebral, and spinal diseases, and in paraplegia.

Chapter seventeenth. *Of the Exercise of Respiration.*—Filling the lungs completely with air, by a full inspiration when the body is otherwise at rest, or in slight and easy movements, is considered by the author to be useful in weak chests, as tending to keep the air-passages pervious; to prevent congestion; and to provide effectually for the chemical changes which the blood is to undergo in the lungs. Distinct recitation in early life has a great tendency to strengthen weak chests.

Chapter eighteenth. *Method of Inquiry as to Contagion.*—The difficulties which have occurred in relation to contagion, the author is of opinion, may be best surmounted, and the apparent anomalies removed ; 1*st*, by due attention to the condition of the person giving the infection, which attaches to the quantity or virulence of the noxious material: 2*d*, to the state of the individual who receives it, as to temperament, general health, and the presence or absence of other specific disorders counteracting the operation of the virus ; and 3*d*, to the nature of the medium of transmission which involves the various states and properties of the atmosphere, and the peculiar character of the fomites or substances which receive and emit the virus.

Chapter nineteenth. *Of the medical treatment of old age.*—We should not interfere with changes, irretrievable in their nature, which have occurred in any organ or function, in consequence of advance in years. In the *catarrhus senilis*, the mucous discharge is often a means of protection to the constitution; and the cough, the instrument by which the bronchial secretion is thrown off. Neither can therefore be checked with safety. Copious lithic secretion, by the urine, as well as habitual discharges from the bowels, are often salutary; as are various passive hemorrhages, which frequently have a tendency to relieve congestions, and thus to obviate the effects of the "new balances in the distribution of blood to particular parts, which are struck in the progress of life." Much caution is required, both as to bleeding and purgatives; and the pulse is often somewhat deceptive, and should be carefully considered in connection with the action of the heart. Opiates do good in the eneuresis of old persons; in prurigo senilis, and under habitual restlessness; and equable temperature is as much as possible to be preserved, together with due attention to proper nourishment, and to exercise which does not fatigue.

Chapter twentieth, *on the use of Emetics.*—The author considers the large employment of purgatives in this country as having, very improperly, brought into great disuse the exhibition of emetics. This class of remedies not only removes undigested food, but morbid secretions from the stomach; and also has a powerful operation on the system generally, by the mechanical impulse which they give. In fevers, jaundice, cynanche tonsillaris, and trachealis, and in diseases of children, emetics are very serviceable; but as an expectorant, they are of the most signal benefit; tending both to promote secretion, and to discharge it. The action of vomiting is little injurious, as is known from sea-sickness, and the sickness which occurs in pregnancy.

Chapter twenty-first, *on the use of Diluents.*—The continental practitioners employ diluents much more extensively than is the case in this country; and their example, the author is of opinion, may, with propriety, be to a certain degree imitated.

He views diluents under three principal conditions of probable usefulness: "*first*, the mere mechanical effects of quantity of liquid in diluting and washing away matters, excrementitious or noxious, from the alimentary canal;—*secondly*, their influence in modifying certain morbid conditions of the blood; and, *thirdly*, their effect upon various functions of secretion and excretion, and especially upon those of the kidneys and skin."

He adduces the operation of a tumbler of water, warm or cold, on an empty stomach, in keeping the bowels open, as an example of the first condition. But considering (which he afterwards admits) the facility and speed with which liquids, taken into the stomach, may be absorbed into the circulation, and even pass off by the kidneys, the mechanical operation thus attributed to this simple remedy can hardly have a place. A certain impulse to the peristaltic motion of the intestines, communicated from the stomach or duodenum, is probably the mode in which the favourable action is effected.

The feelings of the patient, the author thinks, may be fairly taken as a good criterion for the employment of diluents, even in diabetes and dropsy, when there is a vulgar prejudice in favour of their limitation.

Chapter twenty-second, *on morbid actions of intermittent kind.* The exhaustion of nervous power by action, and its renewal by repose, the author gives us one of the great examples of intermittent influence in the animal economy. This influence exhibits itself but little in the functions of organic life ; but attaches very strongly to the animal functions, of which the alternation of sleep and waking, the phenomena of mind, of sensation, and voluntary motion offer examples. The mind and body, in relation to exhaustion, have much sympathy with each other ; and they are not simultaneously capable of strong and continuous efforts. Should both be forced into strong action at the same time, this is done at the expense of great exhaustion of the living power.

Intermittent disorders of sensation are exemplified by those in which *pain* is a prominent feature ; and when this is violent, the intermittent tendency is most distinct ; and sometimes exhibits itself in exhaustion, and consequently sleep.

Morbid intermittent actions of a spasmodic kind arise when the voluntary muscles are concerned, and as examples, the author mentions epilepsy, catalepsy, chorea, hysteria, hooping-cough, hydrophobia, and to a certain degree, *tremor tendinum*, or shaking palsy. The double capacity of the voluntary muscles in being excited respectively by the will, and by the actions of organic life, are important points for consideration in this part of the subject ; and the great length of the intermissions in epilepsy are singularly contrasted with the " accumulation of the cause of spasm," in very short spaces of time, in a case which occurred to the author (p. 326.) The forcibly arresting intermittent spasmodic actions, is often injurious ; and it would seem to the author, as if involuntary movements " are a sort of outlet or discharge for that agent, which, either by excess in quantity or quality, or by some other manner of change inaccessible to research, has become a cause of undue excitement to the system, and requires to be removed from it."

As examples of morbid intermittence, not referable either to sensation or muscular motion, the author adduces fevers, particularly of the intermittent kind ; various neuralgic affections, more especially the Brow-ague ; and many of the singular and anomalous affections which succeed influenza ; such as swellings of the tonsils; inflammation of the eyes, and fits of coughing, coming all of them on at certain stated periods.

Chapter twenty-third, *On Diet and Disorders of Digestion.* —The present chapter on this very extensive subject offers many judicious practical observations, the complaints included under which necessarily form a large part of the practice, and occupy much of the attention of every well-employed medical man. The author forcibly alludes to the difficulties which dyspeptic complaints produce, and the extensive field which they afford to "fraud intrepid in ignorance;" and as a fashionable physician, he must have had his share of acquaintance with that versatility of opinion, in respect to individual medical men, for which the higher orders of society in London are so much distinguished; and which in no order of complaints applies so powerfully as in those of the stomach. Hasty mastication, repletion, causing uneasiness and urgent exercise of mind or body, after meals, must be avoided; and the errors which arise from an undue estimate of the demands of nature during strong exercise, are exemplified in the caution as to taking food, of which the author has had personal experience, in the practice of government messengers, and the Tatar couriers of Turkey.

The proper regulation of food is much connected with the power of obtaining good rest, which is so important to health; and an earlier dinner hour, and a light supper, have often been found by the author very serviceable in this respect. He thinks the prejudice in favour of animal food, has been carried too far in the modern dietetics of this country.

Chapter twenty-fourth. *On Diseases occurring but once in life.* —The following is a summary of his opinions on this subject,—

"*First,* That the series of actions or changes, constituting these diseases, have their seat in the blood, and are carried on throughout by the circulation.

"*Secondly,* That, although we have no cognizance of the actual physical state or changes which give protection against their occurence or recurrence, there is more reason for seeking these in an altered state of the blood than in any other part of the animal organization.

"*Thirdly,* That the conditions which render one disease incompatible with one another,—or produce the various results of their mutual interference,—or limit to man their production and developement,—all probably depend on the same physical principles as the simpler fact of immunity, and have equally their source and seat in the blood.

"*Fourthly,* That the state of immunity, on whatever bodily conditions it depends, is liable to fluctuation in various ways;—often partial and imperfect when first obtained,—occasionally diminished or lost by time, even where there is presumption of its having been most complete at first,—possibly affected in some degree, and after a certain lapse of time, in all;—the rate of such changes different in different persons, and modified also by the access of other diseases, or by the contingencies of life.

" *Fifthly*, That a constitutional or hereditary tendency exists throughout all these phenomena;—modifying susceptibility,—determining, in conjunction, with other causes, the regular or irregular course of the disease,—affecting its degree of virulence,—and giving liability to its recurrence; and that this habit of body is not limited to families, but extends even to larger communities.

" *Sixthly*, That the several modifications, above-named, depend further on the quality or quantity of the virus received in each case;—conditions admitting of being infinitely varied; and giving, in conjunction with the effects of season, locality, and human constitution, the peculiar character which every epidemic more or less assumes."—Pp. 394, 395.

Chapter twenty-fifth, *on the present questions regarding vaccination*.—The physical relation of the vaccine disease to small-pox does not, the author is of opinion, amount to identity; nor is this latter proved by the protection afforded by vaccination against small-pox; for the changes of constitution on which this protection depends, may as readily be produced by a separate agent, " as by a modification of that against which protection is sought."

The term *modified* small-pox seems to the author to be a correct one, in relation to the original disease, affected in its progress by certain previous changes in the body which have been produced by vaccination. He is also of opinion, that there is a specific difference between the chicken-pox, and some other pustular disorders and small-pox. The great increase of small-pox, as in epidemics, " affecting a large proportion of the vaccinated, and implicating great mortality in its results," is now generally admitted. It is no longer denied, either that vaccination is unequal in different cases, or that its effects are lessened in time; nor can the adverse facts be explained on the supposition, of the ignorant or imperfect performance of vaccination at the outset.

Though in some instances protection has extended to thirty-five years, in general it is much less; and the results of Dr Gregory's tables have been confirmed and extended by similar documents from other parts of Europe. Lymph fresh from the cow seems to produce a more marked effect, and greater constitutional affection, than after a long series of transmissions.

The author does not regard as correct the idea, that the protection afforded by vaccination opens a greater scope to the ingress of other contagious diseases. For the purpose of removing the difficulties and embarrassments which attach to this practice of vaccination, and restoring confidence in the practice, the author recommends as often as possible a supply of fresh matter from the cow; revaccination at certain periods, previous to that at which its influence has been calculated materially to diminish; greater attention to the mode of vaccination, particularly as to seeing that one pustule is always left untouched; and taking care to avoid the operation under certain states of bodily ailment. When all these points shall have been attended to, the author considers that there will be reason to expect the revival of confidence in the practice, on the ground of its safety, and the reasonable protection afforded by it, against a dangerous and loathsome disease, which is capable from time to time of being renewed and restored.

Chapter twenty-sixth, *on the use of Opiates.*—Since the introduction of morphia, opiates are much more frequently employed, than when the copious use of purgatives produced some degree of apprehension of undue confinement of the bowels from their exhibition. Except in certain idiosyncrasies, opiates are safe medicines. When they are given to quiet pain, or other disorders of the nervous system, theirusual effects of producing constipation, headach, various nervous symptoms, and even sleep, are altogether wanting. They act as very efficient sudorifics, and in inflammatory complaints are often very useful, in combination with calomel. When the heart and organs of respiration are much enfeebled, and when given to aged persons suffering under catarrhal influenza, they do harm, as is likewise the case when a course of purgative medicines is required for the relief of the portal circulation, or of congestions about the liver and connected organs.

The external application of opium is much approved by the author under many circumstances of disease.

Chapter twenty-seventh, *Of Sleep.*—This remarkable function of life, which consumes more than a third of our existence, does not appear to the author to have received, in its medical relations, all the attention which it merits. It is difficult to distinguish what is the most perfect condition of sleep; but the best proof which a patient can give on this subject, is the absence of the consciousness of dreaming; though this must very much consist in the varying recollection of dreams, since he considers that there is no part of sleep without some condition of dreaming. In this opinion he agrees with the doctrine of the late Mr Dugald Stewart, whom, however, he does not mention on the subject, though usually anxious to give every credit to the authors of opinions which he has occasion to notice.

Sleeping and waking, or rather the shifting to and fro of conditions of imperfect sleep and imperfect waking, alternate with great rapidity and facility with each other, as may be known in the continual lapse into sleep during fatigue on horse-back, from which the loss of balance of the body, as frequently and suddenly arouses it. Profound sleep takes place when "no impressions seem received by the senses, no volition exercised, and no consciousness or memory is left, of thoughts having existed in the mind; but as to this there are various states and acts of sleeping, through their relation to those of waking existence."

The great object in sleep is the reparation of exhausted power, and when there is a total absence of sleep for weeks or months, as occasionally happens in insanity, it would seem to indicate that there is "an actual excess in the production of that nervous power by the exhaustion of which, under ordinary circumstances, sleep is produced."

Strong emotions of mind, or simple intellectual exertion too long protracted, will prevent sleep, and so will great anxiety to bring it on; and various states of the digestive organs in respect to the particular period, at which the digestion of food may have arrived. Heavy and unrefreshing sleep may take place immediately after a full meal; disturbed sleep when the colon becomes loaded from the passing into it of the intestinal contents from the *ileum*.

The author has observed that very sudden and considerable falls of the barometer are attended in many persons with lassitude and drowsiness, followed by restless and uneasy sleep, or laborious dreaming.

Chapter twenty-eighth, *on the Influence of Weather in relation to Disease.*—The author in this essay takes a very comprehensive view of the various circumstances of atmosphere, in respect to temperature; hygrometrical state; weight; and electrical state and changes, which are capable of affecting health; and he brings forward many important and interesting facts in illustration of the subject. In speaking of the application of cold to the surfaces of the body, he notices a remedial influence on the lining membrane of the alimentary canal, as well as on the outer skin. But the influence of cold drink is highly beneficial under a great variety of circumstances, yet it so soon acquires the temperature of the stomach, or is so soon taken up by absorption, as to make its immediate application as a cooling agent in the alimentary canal exceedingly doubtful.

A communication which the author gives from Mr Green, the celebrated aeronaut, showing how readily the body can undergo the most sudden changes of atmospheric weight. "In September 1838, he and Mr Rush ascended to a height of 27,136 feet, or 5½ miles above the level of the sea, the greatest elevation ever reached by man, and very exactly corresponding with the highest ascertained summit of the Himalaya mountains. The barometer fell from 33° 50′ to 11° during this ascent; the thermometer from 61° to 5°. The first 11,000 feet were passed through in about seven minutes. Yet under these remarkable circumstances, Mr Rush felt no inconvenience but from cold, and Mr Green little other than from the toil of discharging ballast and gas, at different intervals, which hurried the respiration during the time." (p. 484.)

Chapter Twenty-ninth, *On Time as an Element in Mental Functions.*—It would appear that the different operations of the mind are materially different as to the duration of time necessary for carrying them into effect in various circumstances of health or disease. Locke says "that there is a kind of restiveness in almost every one's mind. Sometimes, without perceiving the cause, it will boggle and stand still, and one cannot get it a step forward; and at another time it will press forward, and there is no holding it in." A singular variation of time, as noted by different observers at the observatory at Manheim, in relation to the transit of a star across the micrometer thread of a fixed telescope, is accounted for by Professor Muller, by supposing, that the perceptions from the eye and ear, "are distinct and successive states of mind, with varying intervals between them in different individuals."

Chapter thirtieth, *on Phrenology.*—In the present state of our knowledge of the brain, and its relation to the mental functions, the author is of opinion, "that an important view of phrenology requires, not that the doctrine should be put under, but that great abatement should be made of its pretensions to a system." If more attention were paid to the external evidences of a few simple and well marked faculties, "such as those of numerical calculation, languages, or music;" and less to "vague and ill-defined moral propensities," the chances of coming to satisfactory conclusions would be greatly increased.

Chapter thirty-one, *on disturbed balance of circulation, and metastasis of disease.*—The most general distinction, in disturbances of circulation, is that between cases when inflammation is, or when it is not present; and respecting the rationale of the changes which constitute those disturbances, the author makes the following general deductions, namely,—

"First, that the capillaries are, in numerous cases, perhaps in the majority, the first seats of these disordered actions, even where the causes reach them through the general circulation;—secondly, that the direction of such actions, as well as their degree, has relation to the particular endowments, nervous and vascular, of each part, and to the functions they severally perform;—thirdly, that the quality and quantity of the blood in circulation, but particularly the former, have also much effect in determining the nature and extent of these disturbances;—and, fourthly, that there are further causes, producing or modifying them, in the influence of the sensorium and different parts of the nervous system; these causes operating, directly or indirectly, partially or generally, on the whole vascular system, exclusively even of the action of the heart."—P. 536.

With regard to metastasis, the influence of similarity of texture, whether continuous or not, is an important circumstance of consideration; as is likewise a certain connection of function between the parts which are the subjects of such changes. Many of the metastases which take place in gout, scrofula, and other constitutional diseases, seem connected with, or dependent on, morbid states of the blood, and have no difference in principle from the different periods of time required to transfer the disordered action from one place to another. During this period of transference, whether long or short, there is often, as the author has found, much disturbance of the heart and nervous system, as well as of various other organs not seemingly connected with the disease. The critical termination of some maladies; the relation between certain morbid actions of the kidney, and disordered states of brain; and the reciprocity of action between the various intestinal membranes and skin, are adverted to by the author, in connection with this subject.

Chapter thirty-second, *on the use of Digitalis.*—The capacities of this medicine have not, the author thinks, been brought into full use. Its sedative effects on the heart, have occasioned it to be viewed with some apprehension as a curative agent; but he has never seen any injurious consequences from that property. He has given it in diseased structure of the heart, and under irregular action of that organ; which latter, if arising from effusion, digitalis may remove. Its use as a sedative, in inflammatory diseases, may, the author is of opinion, be much extended. It has no power over tubercular deposits in the lungs; and it should be given in some of the usual variety of combinations, to effect a diuretic operation. With regard to the form of exhibition, the infusion has been most satisfactory to the author. The operation of digitalis seems to him to be on the vascular system.

Chapter thirty-third, *on Antimonial Medicines.*—The author is of opinion that the antimonial powder is perfectly inert in any ordinary dose; that James's powder deserves no character in the usual trifling quantities in which it is given; and that the only preparation to be depended upon is emetic tartar. The effect of this medicine is to diminish vascular action, independently of any of its usual or obvious modes of operation, whether on the stomach, bowels, or skin. Hence its importance, whether singly or in combination with mercury, in various inflammatory diseases, particularly pneumonia, bronchitis, croup, and affections of brain. It should be given, according to the best French authority, in doses of one or two grains, so repeated as to extend from five to twenty grains in the twenty-four hours; and it may often be exhibited with benefit, in combination with opium, in inflammatory diseases, unless in cases where bleeding may be required, and then the opium should be withheld.

Chapter thirty-fourth, *on the Hypothesis of Insect Life as a cause of Disease?*—The speculations contained in this article connect themselves with the supposed production, from the sting of insects, of some pestilences in Siberia, as described in Humboldt's, Ehrenberg's, and Rode's Travels, lately published. The immense number, minuteness, and fecundity of some of the entozoa afford to Ehrenberg arguments for believing that they form a direct cause of many of the diseases affecting man; and as every attempt to account for the various phenomena of cholera, or any known principles, have completely failed, the author thinks it a fair subject of inquiry, whether we may look " to animalcule life, diffused by the atmosphere, or by man, as the source of the disease; " a form of life not cognizable by our senses, or other direct means of research, but nevertheless subject to some similar laws of propagation and diffusion as species more obvious to us, and producing a virus which acts noxiously on the human body."

The faculty of reproduction possessed by cholera is favourable to this idea; as are its sudden appearance and disappearance in certain localities; its spreading in the face of a prevailing wind; its preference of direction along the course of waters; and the frequent occurrence of isolated cases. The infectious nature of cholera is compatible, the author is of opinion, with an animal origin; and the transportation of cholera from the infected towns of Liverpool, Dublin, and Greenock, to Quebec, he considers as leaving the contagious character unambiguous. Man is chiefly obnoxious to the virus of cholera; but there is distinct evidence in relation to its effects on birds, according to a late report of the Medical Faculty of Vienna. The notion of an operation of animal virus in the production of cholera is much supported by the phenomena of the disease; such an agent being applied to absorbing surfaces, through which it enters the circulation, and produces those speedy changes in the properties of the blood, in which the author considers " the great practice in the disease" to consist, " the basis probably of all the other symptoms." The sudden appearance of insect swarms sometimes takes place even in this country; and a remarkable example of a vast swarm of minute aphides, is mentioned by the author as having occurred in October 1836, and passed over a wide district, in Cheshire, Derbyshire, and the southern parts of Lancashire and Yorkshire. The town of Manchester was infested with them for two or three days, and in one locality, their superficial extent must have been twelve miles in one direction, by five in another. The air was so thickly filled with them, that the clothes and faces of persons walking out of doors were completely covered. The height of the column was not known.

The last chapter is *on the present state of inquiry into the nervous system*; and in this the author takes an interesting and comprehensive view of much that has been done on this subject, of various difficulties which attend the investigation, and of some of the most important points to which it is desirable to direct research.

"The subject of this chapter," says the author, "is that to which all separate researches in physiology converge; blending themselves in this common centre,—on the one hand, with the higher doctrines of life, reproduction, and mental existence;—on the other, with those great general powers or laws of inanimate nature which are ever in action within and around us. Physiological science, on the matter in question, seems at this moment to be on the verge of some greater discovery; resembling in this respect the actual state of other physical sciences—those of light, heat, electricity, chemical forces, and perchance gravitation—which the course of modern inquiry is ever tending to reduce to certain common laws. It is a question of deep interest, already referred to, whether the relation here is not closer than that of mere analogy; and whether future research may not associate some of the functions of the nervous system with the more general elements of force and action in the physical world. Vital laws, and what we term physical laws, stand precisely in the same relation to our knowledge. They are continually approximating as this knowledge advances; and may not impossibly in the end be submitted, even in human comprehension, to some common principle, embracing the whole series of phenomena, however remote and dissimilar they now appear."—P. 627.

In closing this article we must express the pleasure which we have had in accompanying the able and amiable author, through so many of those inquiries and speculations, which must have increased greatly the effect and interest of his professional life. The candour, philosophical spirit, science, and information, which exhibit themselves through every part of his Notes and Reflections, are ample proofs that the public estimation in which he is held is not misplaced. We add further, what cannot be said of every fashionable physician, that he evinces much attachment to the studies of his profession, and an anxious desire for its improvement.

Much as has been done in the cultivation of medical science in modern times, the work before us exhibits evidence, in what a great variety of instances we have reached only a knowledge of the *αἰτίην ἐοικῦιαν*, the probable cause of disease; while in respect to the *αἰτίην ἀτρεκέα*, or true nature, we are as much in the dark, as the author quotes Aretæus to have been in his time, on the subject of gout.

The author shows much acquaintance with ancient medical literature; but as we suspect that the attributes of Hudibras do not extensively apply to his readers, in respect to the Greek language, we should have seen no derogation from the dignity of medical science, if he had given his Greek quotations as notes, confirmatory of the statements of the text, instead of taking it for granted, that Greek is usually so familiar a language, as to be read and understood consecutively with English itself. If the author deemed it necessary to give the position of a well-known passage of Milton or Horace, (which is usually the case,) we submit, that there was at least an equal necessity for offering as ready a mode of reference to a passage of Hippocrates, Aretæus, or Aristotle.

We are surprised to observe that a writer of the taste of Dr Holland employs the exotic term grade, (p. 450.)

ART. IV.—*An Exposition of the Symptoms, essential Nature, and Treatment of Neuropathy or Nervousness.* By JAMES MANBY GULLY, M.D. London, 1837. Pp. 192.

Dr GULLY affixes this title to the disease long known by the name of hypochondriasis, regarding nervousness as merely a less intense degree of that state. The symptoms of this disease he details at considerable length, under the various heads of, 1. sensations; 2. movements; 3. disorder of the internal or organic functions; and, 4. mental disorders. This is followed with a number of illustrative cases, pointing out the various anomalous forms which the disease presents, more especially in reference to the viscera of the abdomen and of the chest, and the seats of sympathetic or voluntary motion; and the author concludes this part of the subject by giving a concentrated view of the symptoms characteristic of the minor degree of neuropathy, or that to which the term nervousness is more properly applied. The description of the characteristic symptoms of this form of nervous disease by Dr Gully may be given in his own words.

"Of the degree of neuropathy as above exemplified, a symptomatical resumé may thus be made:—Indefinable uneasiness; despondency or irritability of mind; diminution of physical strength; yielding and tremblings of the limbs; starting at noises and sights; giddiness, and tendency to faint; sense of sinking or dragging at the epigastrium; sensitiveness, or pain of the abdomen; pains, generally of a transitory nature, in various parts of the body; partial and occasional obfuscation of sight: numbness, or, on the other hand, preternatural sensitiveness of some point; partial sensations of heat, as in flushing of the face or burning of the eyeballs; creeping sensations; itching sensations, particularly of the eyelids, nose, or scalp; shuddering, with or without external causes; involuntary twitchings of the limbs and face; palpitation of the heart, and at the epigastrium; sighing; hard cough; sense of dread or shame without definable cause; tendency to incessant motion and change of place; sleeplessness, or broken, dreamy, unrefreshing sleep; appetite capricious, sometimes, however, unchanged and steady;

nausea, or vomiting; secretion of the mucous membrane of the eyelids and nose generally diminished; the tongue sometimes foul, frequently otherwise, but for the most part redder or more turgid than usual, with tendency to dryness; bowels costive, but frequently distended with air and rumbling; urine varying with the nervous symptoms or the food; countenance oftentimes unchanged, but more frequently anxious, or, as it were, on the *qui vive;* complexion often florid; emaciation rarely to any extent; feet and hands almost invariably cold and clammy."—P. 52.

The author next adduces a number of cases of neuropathy in which the cerebral symptoms predominate; that form to which he limits the term hypochondriasis. He notices very shortly the exciting causes of neuropathy, which may be stated to be all those which debilitate the system. He remarks, that the milder form is more common between the ages of seventeen and thirty; whilst the more severe form is more frequently observed after the age of forty. The author also attributes the prevalence of this disease to a high degree of civilization; and in a note he says, " neuropathy in any of its degrees is a disease altogether unknown among barbarous nations. And there cannot be a doubt, that in all its degrees it has much increased in this country within the last thirty years, a period in which civilization has made such giant strides."

The author next enters at great length into a disquisition on the essential nature of neuropathy, and after mentioning the various theories of authors on the subject, sums up his own in the following words: " That in the minor degree of neuropathy, or simple nervousness, the ganglionic matter distributed about the epigastrium is the only permanently diseased point; while in the more intense degree, disorder of the brain is added to that of the ganglionic matter alluded to, and partially assists in the maintenance of the symptoms." In support of this opinion he gives eight " leading propositions in the physiology of the body," the correctness of some of which we would be inclined to question, and by a species of mathematical reasoning on these assumed premises, he arrives at the conclusions quoted above. The author's opinions and reasonings, are, on some points, rather fanciful; in the main, however, the hypothesis, for it is no more, appears to be as plausible as any yet adduced. He casually mentions a fact of which every medical practitioner must be cognizant, that " seven-tenths of the nervous cases that are met with in this country are the result of excessive medication."

Constitutional nervousness is next considered; and the author gives a detail of the usual physical condition of those who come under the general term nervous, and again presses strongly on the attention the connection which exists between the brain and the viscera.

We come next to the treatment of the disease. This is considered under two heads, *first*, as applicable to simple nervousness; and, *secondly*, to the severer form or hypochondriasis. The first class of remedies mentioned are the antispasmodics, and these the author considers as "not entitled to such reliance as would justify their administration in even the small minority of cases;" and that, as curatives, they are inadmissible. He admits, however, their use as a means of affording temporary relief, and gives the preference to the tincture of *Castoreum*, musk, and the aromatic spirit of ammonia; but wishes the employment of these to be limited to the more pressing symptoms, as where hysterical strangulation, convulsions, or locked jaw are superadded to the signs of simple nervousness.

To the employment of sedatives the author is averse, seeing that at best they are only palliatives, and that the worst consequences ensue from their continued use. When palliatives of this class require to be exhibited, the author gives the preference to henbane and prussic acid. He administers the extract of henbane in combination with opium and musk, and in this form he has found it highly useful in relieving nervous headach, &c. But hydrocyanic acid he holds up as the most useful of all the palliative remedies, as by it the nausea, thirst, and loss of appetite, caused by the others, are avoided; and he is of opinion that this, in conjunction with other remedies, contributes materially to the cure. The sensations of sinking and gnawing in the epigastrium are those which he has found it is best calculated to subdue.

The author condemns the whole class of purgatives, considering them as one of the most frequent excitants of nervousness, and that their employment hastens the progress of disease from the simple nervous to the hypochondriacal state.

Tonics, especially when administered in a diluted or mild form, Dr Gully considers decidedly beneficial, though when powerful or given in too large doses, they are to a certain extent liable to the same objections as the preceding remedies. When, however, they induce no phenomena of vehement excitement, and are not succeeded by the exhaustion which is the characteristic secondary effect of antispasmodic remedies, their action is much more uniform and satisfactory. He prefers the infusions of the bitters, giving an ounce three or four times daily. Of the metallic tonics he prefers the subnitrate of bismuth and the sesquioxide of iron, giving them in the small doses of one to three grains three or four times daily.

Dr Gully speaks favourably of counter-irritation as a remedial means, from the gentle stimulus of the flesh brush to the most powerful of the irritant plasters or even moxas. "On the whole, he says, the species of irritation to be erected on the epigastric region appears most beneficial when it produces the sensation of tingling or itching; beyond that degree it is as likely to aggravate as to allay the symptoms of simple nervousness." He is also favourable to the daily use of stimulant enemata, preferring this mode of relieving the bowels to all others.

Having thus disposed of the medicinal agents, the author passes to the consideration of the hygienic treatment. With regard to this, the author's directions are concise, and appear likely to answer the end intended. The diet he recommends to be nutritive, in small and oft-repeated quantities. Animal food, plain boiled or roasted, and bread, every four or five hours, avoiding fatty matters, and all condiments excepting salt. The fluids he recommends should be small in quantity, but he allows a glass or two of good wine after eating.

With regard to exercise, he directs that none be taken before breakfast, that, in fact, this meal is best taken in bed. He begins with carriage exercise, or simply sitting in the open air, till the strength be sufficiently recovered to admit of more active exertion. Quietude of mind and of body, he asserts, are absolutely requisite for obtaining fully the beneficial results of the remedial means pursued. Cool air and cold bathing, with proper attention to clothing, we have also found beneficial.

The treatment of the major degree of neuropathy or hypochondriasis, is next entered on, but more shortly. According to the views of the author, this variety, consisting in the permanent extension of the visceral ganglionic irritation to the cerebral centre, which thus comes to play a part in the maintenance of the symptoms, the attention is naturally directed to the brain in the consideration of the treatment. Most of the remarks made with regard to the remedial means of the first variety, or nervousness, apply to hypochondriacism also; only strychnine is added to the list of his tonics. His chief reliance is, however, placed on counter-irritation. After enumerating a number of liniments, plasters, vesicatories, &c. he says, "of all this class of remedies I have derived the most decided and permanent benefit from the moxas, burned in various places on a line extending from one hypochondriac region to the other, and crossing the epigastrium." In this disease the author considers it essential to attend to the condition of the cerebro-spinal axis, and excite its functions by proper means. This is to be attained by engaging freely in social scenes, in the vigorous exercise of the muscles, as in rowing, riding, walking, and dancing; in shocks to the nervous system by cold bathing, &c. He directs the same attention to dietetic rules as for simple nervousness.

The present volume is written in a lucid style, and, though not remarkable for novelty either in theory or practice, exhibits a just view of the disorder, and deserves the perusal of every medical practitioner who wishes to make himself acquainted with this too common and troublesome complaint.

ART. V.—1. *Pharmacopœia Collegii Regalis Medicorum Londinensis.* 12mo. London, 1836.—*Translation of the Pharmacopœia of the Royal College of Physicians of London,* 1836; *with Notes and Illustrations.* By RICHARD PHILLIPS, F. R. S., &c. 8vo. London, 1837.

2. *The Pharmacopœia of the Royal College of Physicians of Edinburgh.* 18mo. Edinburgh, 1839.

SOME apology is due to the London College of Physicians for the length of time which has elapsed since the publication of their new Pharmacopœia, without its having been noticed in this Journal. The neglect on our part was not intentional. In fact, a notice of this work had been written some time ago, but a variety of circumstances combined to prevent its insertion at the time, and it has since been purposely delayed, in expectation of the appearance of the Edinburgh Pharmacopœia, our wish being, by noticing both at the same time, to obtain a comparative view of their respective merits.

We had hoped that by this time, instead of three separate Pharmacopœias for the different portions of the British Empire, we should have had the satisfaction of possessing a single Pharmacopœia for the whole United Kingdom; but in this we have been disappointed. Such a project, however, has seriously engaged the attention of both the English and Scotch Colleges, as appears from their respective prefaces; but we have no satisfactory statement made by either, as to the reason why this plan miscarried. That the production of a conjoint Pharmacopœia would be a work of great labour we have no doubt, especially if the communication betwixt the colleges is to be carried on by writing; and we presume that it was some experience of this kind which has made the London College tell us that it was on account of the great distance, that the negociations with Edinburgh were abandoned. This does not appear to us a satisfactory explanation, and we cannot help thinking, that, had a sufficiency of zeal for this important object been felt on both sides, as regards England and Scotland at least, this difficulty might have been got over.

So far as we have heard, the break appears to have been on the part of the London College, which at the time when the two bodies had gone so far in their negociations, as to be considering the details of the Materia Medica, became impatient of the delay, and wrote to Edinburgh to say, that there was such a demand for the immediate appearance of a new Pharmacopœia, that they had resolved to publish one of their own. This, however, they did not do till eighteen months after. We do not see why the Edinburgh College did not set about their Pharmacopœia as speedily as their London friends, as they have been more than two years and a half later of bringing it out. We trust, however, that the importance of an Imperial Pharmacopœia will not be lost sight of, and that this desirable object may, before long, be attained; but we are afraid that, in present circumstances, we cannot expect this to be done spontaneously by the Colleges, and we must look to the Legislature for its accomplishment. It would surely be well worth the attention of the Government to have this brought about. In the construction of an Imperial Pharmacopœia we should have a large amount of pharmaceutical and practical skill, brought to bear on one common work, instead of having it dispersed over three, and we should not, as at present, have in different parts of the kingdom, the same medicine designated by different names, the same substance of different strengths, and a multiplicity of processes for the same preparation, all professing to be equally good,—a state of matters which is embarrassing alike to the student, the practitioner, and the apothecary. Were this accomplished, one very important step would be taken towards improving that department of our profession which relates to medicinal substances. We should have the nomenclature less confused, and the medicines more uniform, and thus, on which ever side of the Tweed a prescription might be written, it would be more readily understood, and the medicine would be more certain of possessing the same properties, whether it was dispensed in London or Edinburgh. It is likewise probable that, by conjoining the talent of London, Edinburgh, and Dublin, we should have better processes for many of the preparations, and medicines would thus ultimately be procured both better and cheaper.

To effect this thoroughly, however, we apprehend that something more is required than merely to have a good common Pharmacopœia. However well this may be done by the bodies on which the duty at present devolves, we are sure that there always must be many points, especially in reference to facility of manipulation and economy, in which they would be materially aided by suggestions from the persons who are to be entrusted with the execution of the recommendations of the Pharmacopœia; but before we can hope for much aid from this quarter, we must have a higher standard of qualification for those who are engaged in the practice of pharmacy. This is to be obtained only by obliging all those who intend to fellow this occupation to go through a prescribed course of education, and to undergo a regular examination before a competent board, in order to obtain a licence to act as chemists and druggists.

We believe that the propriety of such a measure as this, is now pretty generally agreed upon by those who have taken most pains to consider the present state of the medical profession, nevertheless, we are not sure that so great a change in the present system, as that now advocated, may not meet with much opposition. In these times limitations of franchise, and interference with free trade, are not popular, but where the interests of the public and the profession are concerned this must be disregarded.

An objection very likely to be urged is, that, under the present system, we have plenty of good apothecaries, who can perform the processes of the Pharmacopœia successfully, and make up our prescriptions well and accurately. To the truth of this we at once subscribe, but we are not satisfied with so meagre an amount of usefulness. We wish our chemists and druggists to be able not only to follow, but to forward the art of pharmacy,—not to serve the physician, but to co-operate with him,—not to be merely merchants trading in medicinal substances,—or artisans engaged in preparing them, but to take their place as members of a distinct and most important division of the medical profession. It is, we believe, to the want of a proper standard of qualification in our apothecaries, that we must in great measure attribute the smallness of the amount of pharmaceutical invention or discovery, which has emanated from Great Britain. Compare the state of matters here with what obtains on the Continent. Here any one may set himself up as a chemist and druggist, who has funds to provide himself with a shop and a stock of medicines, no matter how destitute he may be of any thorough knowledge of the sciences which bear upon his occupation,—no matter how small may be his acquaintance with the language and meaning of physicians' prescriptions. Extreme instances of this may not be common, but they do occur, and they are permitted, and that is an evil which calls for remedy. In France, on the contrary, the arrangement is very different. There are in that country three regular schools of pharmacy entitled to grant diplomas, and every one who means to practise as a *pharmacien* must have obtained a license from one of these. He must have studied botany, natural history of medicines, chemistry and pharmacy, besides having for three years attended in a licensed druggist's shop; but if he has been eight years in this situation, the above course of study is not demanded. In either case, however, he must undergo three separate examinations; 1. on the general principles of his profession; 2. on the botany and natural history of drugs; 3. on practical knowledge; and this last examination is of four days duration, and embraces nine pharmaceutical processes, which he must perform and explain. We have been present at one of these examinations, and we know that it is of a most searching character.

Now the result of this system has been, that, on the continent, pharmacy has made rapid advances, whilst comparatively little has been done for it in Britain. The most interesting discoveries, and the most important improvements in this department, have been imported to us from abroad. There are two excellent continental Journals, the *Journal de Pharmacie* and the *Annalen der Pharmacie*, the chief contributors to which are derived from the class of *Pharmaciens*, with which we have nothing at all in the department of pharmacy to compare; and we search in vain among our pharmaceutists, for names as distinguished in science, as those of Sertuerner, Buchner, Robiquet, Pelletier, Guibourt, &c. We hope, however, that this important subject will ere long attract the attention of the Legislature, and that we shall soon have our chemists and druggists as regularly taught, examined, and licensed as our physicians, surgeons, and general practitioners. We have been led somewhat into a digression from the subject which forms the title of this article; but we thought it not inappropriate, in reviewing two pharmaceutical works, to make a few observations on the present state of pharmacy in Britain.

The last edition of the London Pharmacopœia was published in 1824, that now under consideration in 1836. In that interval, a good deal has been done in the way of pharmacy, and a great many new remedies have come into vogue, so that a considerable number have now been introduced for the first time.

Before proceeding to consider some of the details of the London Pharmacopœia, we beg leave to make a few observations on it of a general kind. We are aware that we have been anticipated in some of our remarks by another reviewer, whose criticism itself we have not seen, but the existence of which has been made known to us, by an appendix which Dr Paris has published to the last edition of his Pharmacologia. We cordially agree with many of the opinions which appear to have been expressed by this reviewer, although they have excited a sad commotion in the breast of Dr Paris. As to the general style of the criticism of which the Doctor complains, we know nothing, not having seen it; but of this we are sure, that, if it be characterized by an ill-natured temper and style, that forms no good reason for Dr Paris putting his reply, as he has done, on the same level. We confess that we see nothing in the opinions quoted by Dr Paris, which is all we have seen of it, that should warrant the defender of the Pharmacopœia, in descending to such vulgar classicalities as saying of his critic, "*naviget Anticyram,*" or comparing him to the "*improbus anser, et morsu laedit et stercore.*"

The present Pharmacopœia, like its predecessors, is written in Latin, which practice, according to Dr Paris, has been continued, because the committee had no option so long as physicians continue to write their prescriptions in Latin. We think that this difficulty might have been got over by giving each article a Latin pharmaceutical name; the anglicising the formulæ for preparing it would hardly have clashed much with the Latin prescriptions of physicians. The readiness with which translations of the Pharmacopœia are produced and sold, shows that the Latin dress of the original is felt to be troublesome. Several translations of this edition have appeared, but the only one we think it necessary to notice now, is that by Mr Richard Phillips, which to the student is rendered doubly valuable by having a copious set of explanatory notes and diagrams of the chemical processes appended to it. This, we have no doubt, will be much more generally used than the original; and this very circumstance is in itself a disadvantage, for in consequence of this the Latin edition will have but a slow sale, and will, even though the advance of parmaceutical science required it, interfere to prevent the production of another edition for sometime. With regard to Dr Paris's horror at the "vulgar taste of obliterating whatever has the semblance of learning," we may observe, that we think the Doctor's expression here quoted a happy one, the "semblance of learning," being all the advantage which the latinity in this case has over the vernacular.

There is another feature in the Pharmacopœia which requires especial notice, and which is made the subject of a paragraph of the preface. We allude to the nomenclature. We quote the passage, using, for convenience, Mr Philips's translation. "In the present day it is scarcely necessary to discuss the change of names; for though all admit that it ought not to be done inconsiderately, yet it was to be feared, lest the avoidance of the error likely to arise from the change should lead to a greater one: We are persuaded that the name which the most eminent professors of the science have bestowed upon a substance will, eventually, be the most certain and permanent. We have, therefore, determined to follow in their footsteps, and put up for a short time with inconvenience, if any should arise, or learn to speak barbarously, rather than incur the danger of becoming obscure, from employing a doubtful or ill-defined expression. If we, ourselves, have invented one or two, we have done so in accordance with these principles."

We confess we do not exactly see the force of this; we see many an error which might arise from people being obliged to use names, the exact signification of which they may not clearly comprehend; but we cannot see that any greater error is likely to follow from their employing terms, which have been familiar to them for years, as signifying particular well known substances, even though these terms should not be scientifically correct. In writing and preparing prescriptions, the great object should always be accuracy, and the avoidance of every thing which may lead to confusion; and this we are certain cannot be insured, if practitioners of long standing, for example, are to be obliged to adopt new names, many of which are easily confounded, merely because they are in accordance with a prevalent chemical theory, which their more important practical avocations have prevented them from studying. If they are not *obliged* to use them, and we do not suppose they are, and if some use one term and some another for the same substance, no advantage can be said to have resulted from the change. The truth is, errors will arise and have arisen. We believe that it is a well known fact, that a case of poisoning did occur, to one of the most enlightened physicians of London, on the occasion of a former change of nomenclature, from a mistake as to the difference between muriate and submuriate of mercury. By the present Pharmacopœia we are taught to call these bichloride and chloride of mercury. Are these names likely to be less doubtful, or are they better defined than corrosive sublimate and calomel?

We saw a good illustration of the result of using new names, the other day, in looking over a short communication in the Lancet. The writer, in speaking of iodide of potassium, calls it iodide of potash, and, as if to prevent the possibility of its being imputed to a clerical error, repeats it in Latin *Iodidum Potassæ.* In the present instance, it is true, no other substance was likely to have been given instead of that which was intended; but the mistake might have occurred with any other of the *Haloid* salts, and the physician might unwittingly have prescribed chloride of lime for a scrofulous patient instead of chloride of calcium; or, *vice versa*, might have ordered the latter instead of the former to disinfect a fever-ward. With students fresh from the chemistry class-room, or with lecturers on Materia Medica, these new names may be all very well, but with older practitioners, who have other things to think of than chemical theories, they are productive only of embarrassment and confusion. Besides, we are not at all sure that the names given by the most eminent professors of the science, will always be the most certain and permanent. Corrosive sublimate has been known to every one as corrosive sublimate, for at least a century, though it has by chemists been, within a short number of years, successively designated muriate, oxymuriate, and bichloride of mercury.

The employment of an alphabetical arrangement is a decided improvement, which, the College tell us, they adopted "rather for the convenience of the physician, than to consult the opinions of philosophers, or indulge the fancy of theorists." Why did not these very excellent reasons weigh with them in respect to the nomenclature also?

Perhaps the most important improvement, however, in the Pharmacopœia has been the addition of a series of notes for ascertaining the purity of the medicines required. This we have heard originated in a suggestion from the Edinburgh College; and we know that it was alluded to in the course of the evidence laid before the Medical Committee of the House of Commons in 1834. The college deserve credit for adopting the plan, from whatever source they derived the suggestion; but we cannot say that they appear to us to have followed it out in an efficient manner. They appear to have in a great measure mistaken the object to be held in view. They have given a series of processes which are rather experiments of demonstration, such as are adapted for a chemical class, than tests for determining the purity of the substance; and where this has been attempted, it has been done in so loose and unsatisfactory a manner, as scarcely to be of any service to the retail druggist, in testing the value of the substance which he purchases from the wholesale dealer. Thus, in the case of morphia, they have taken the trouble to state the reaction of nitric acid, tincture of muriate of iron, chlorine and ammonia upon it; whilst under the head of muriate of morphia they have only said, that it is soluble in water, and that nitrate of silver gives a precipitate with the solution which is not totally dissolved by ammonia, unless in excess, or by muriatic or nitric acid; but there is nothing stated which could enable the country apothecary to ascertain, that the muriate of morphia, with which the wholesale dealer supplies him, has not been adulterated with substances soluble in water, or to know any thing further concerning it than that it is a muriate. The account of the acetate is more meagre still. Again, with respect to sulphuric ether, there are no means indicated of detecting if it contain alcohol or water, which it very commonly does, and the specific gravity given is no test of its purity, as they have adopted a standard at least twelve or fifteen degrees from that of purity. These notes, moreover, imperfect as they are, are almost, if not entirely, confined to chemicals, and the college consider that tests of purity are less necessary with vegetable and animal substances, and are also more difficult. That they are less necessary we at once deny. Our vegetable substances are among the most adulterated drugs we have, and the difficulty we hold to be a very indifferent reason for not at least attempting to give tests for some of them.

The college have very properly altered their liquid measures to the imperial standard of the realm; a measure productive of great convenience, and in accordance with which they have, evidently with great trouble and exactness, altered the quantities to be employed in many of their processes, so that the proportions remain as before.

The list of Materia Medica is considerably altered from the last, especially in respect to the new names, and the addition of some of the more recently introduced remedies. The following articles have been expunged; *Acidum Aceticum Fortius*, for the preparation of which a formula is now given; *Antimonii Vitrum*, properly abandoned for the preparation of tartar emetic; *Bistortæ Radix*, *Fucus Vesiculosus*, *Helleborus Fœtidus*, *Linum Catharticum*, *Ricini Semina*, *Rubiæ Radix*, *Salicis Cortex*, *Sassafras Lignum*, the root is retained, *Spongia Officinalis*. These expulsions, with perhaps the exception of the last, are judicious; the list might safely have been increased by the addition of *Cardamine Pratensis*, *Erythraea Centaurium*, and *Menyanthes Trifoliata*. The additions to the list of Materia Medica are, *Aurantii Oleum*, *Bromine*, *Chimaphila Corymbosa*, better known as *Pyrola Umbellata*, *Creasote*, *Carbonate of Barytes*, *Buchu*, referred to *Diosma Crenata*, *Ergot*, referred on the authority of Fries to *Acinula Clavus*, though Dr Lindley tells us that Fries has no such species in his whole works; *Prussian Blue*, called *Percyanide of Iron*, *Litmus*, *Lactucarium*, *Lobelia Inflata*, *Binoxide of Manganese*; *Arrow Root*, under the officinal title of *Maranta*, *Pareira Brava*, *Phosphorus*, *Sabadilla* referred to *Helonias Officinalis*, *Chlorate of Potass*, *Prussiate of Potass*, under the name of *Ferrocyanide of Potassium*, *Quina*, surely by some mistake, else why not morphia? *Acetate of Soda*, *Treacle* for pill masses, *Spiritus Vini Gallici*, *Sago*.

The college do not seem to have taken much trouble with respect to the botanical part of their Materia Medica. Thus aloes is referred exclusively to *Aloe Spicata*, which is decidedly an error, unless the college mean to exclude both the Barbadoes and East Indian kinds, neither of which is probably yielded by this species. Rhubarb is referred, as in last edition, without any authority, to *Rheum Palmatum*, although there is no evidence that this is the source of either the Russian or Chinese rhubarb; and, notwithstanding the evidence adduced by Von Bergen in his Monographie der China, published ten years previous, they continue to refer without note or comment the pale, yellow, and red barks to *Cinchona Lancifolia*, *Cordifolia*, and *Oblongifolia*, not one of which probably yields the kind which is assigned to it. In none of these cases ought they to have referred to particular plants, substances which they give no authority to prove being yielded by them.

In the *Preparata et Composita* there are likewise many changes worthy of notice.

With respect to new articles of the Materia Medica and new preparations, we may observe, that there are many which, in the present state of our knowledge regarding them, ought not to have been thrust into the Pharmacopœia. The college seem of late to have got quite a new light on this subject. In his evidence before Mr Warburton's committee, Sir Henry Halford stated, as a sort of apology for the omission of many well-known remedies from the last Pharmacopœia, that " it required a great deal of care and experience to say what should be recommended by public authority and what not." And Dr Paris said, " it has been the rule always adopted by the college, (and I believe a very wholesome one,) not to admit any one (remedy) until it has been fairly tried, and its efficacy decided. If we had an ephemeral Pharmacopœia it would be filled with quackery of every description." So said the President and one of the members of the Pharmacopœia committee in 1834. In 1836, however, the preface to the Pharmacopœia says, " if some of these (preparations) should seem but little approved by experience, we have nevertheless included them in this work, that if any one should think fit to administer them, they may have them accurately prepared;" and Dr Paris himself, in his supplement to his Pharmacologia in 1838, makes the following observations, in reply to allegations as to the inefficacy of certain of their articles.

" Under this head I would remark, that, upon all former occasions, it was a standing rule in the committee, that no article should be introduced that did not receive the sanction and approbation of some one of its members, from a personal experience of its utility. From this rule, however, it was deemed expedient to depart, for the following reason: That articles, whether intrinsically valuable or not, were frequently used by a large proportion of the profession; and as many of such articles were potent and highly dangerous in their effects, that it became the paramount duty of the college to insure, as far as possible, the correctness of their preparation and the uniformity of their strength. The profession will, therefore, be pleased to view their introduction into the Pharmacopœia, as a measure not of sanction and recommendation, but solely as one of prudencc and caution."

The necessity for care and experience, therefore, is here fairly renounced; and we have quoted as evidence of prudence and caution, the correctness of the formulæ for remedies almost untried, many of which are potent and highly dangerous in their effects, and for which the college declines to guarantee sanction and recommendation. This places the Pharmacopœia in a very different light from that in which it used to be viewed. It is thus put forth merely as a book of manipulation, not as a work sanctioning and authorizing remedies of real value. This would be all very well if the Pharmacopœia were the work of a college of druggists and chemists; but when it bears the name of a college of physicians, its authority ought to be of a higher standard, and take cognizance of the utility of the remedies, as well as the correctness of their preparation. These remarks apply, we believe, to a certain extent, to all the three present British Pharmacopœias; but the London College appears to be most particularly in error in this respect.

We return to the *preparata et composita*, and beg the attention of our readers to a few of the details.

Acidum Aceticum, formerly Ac. Acet. Fortius, is now ordered to be prepared from *Acetate of Soda* by sulphuric acid. This we take to be a good and economical process, as this salt is now prepared extensively from pyroligneous acid for yielding pure acetic acid. It does not, however, yield the very strongest acid by this process, which would have been improved by ordering the salt to be previously heated to expel the water of crystallization.

Acetum Cantharidis is new. The proportions ordered here, however, are not good. It should be made with one part of the flies to four of acetic acid, instead of one to ten, for when of this last strength it does not possess its most important advantage of operating as a blister at once.

Acidum Hydrochloricum, the new name for muriatic acid, is ordered to be as in last Pharmacopœia, of specific gravity 1160. It might be got stronger by using more sulphuric acid.

Acidum Hydrochloricum Dilutum is new; it is made with one measure of the strong acid to three of water. This is a better proportion than that of the Dublin College, which is not sufficiently diluted.

Acidum Hydrocyanicum Dilutum, admitted for the first time, is ordered to be prepared from prussiate of potash by sulphuric acid. But the college have likewise admitted Mr Everitt's ingenious process for obtaining the acid extempore, by the action of muriatic acid on cyanide of silver. In either case, the acid is ordered to contain 2 per cent. of dry acid, which appears to be a convenient strength for administration.

Acidum Phosphoricum Dilutum has been introduced. This is one of the new remedies which might have been spared. We know of no advantage it possesses over the other dilute mineral acids. The process is both troublesome and expensive. It is ordered to be prepared by boiling phosphorus in diluted nitric acid, evaporating in a platina capsule, and diluting to a given strength.

Acidum Tartaricum. The process is improved; the whole tartaric acid being now obtained, by precipitating by an extempore solution of muriate of lime, the neutral tartrate which remains after the addition of the chalk.

Ætherea. No separate process is now given for rectifying ether; but it is ordered always to be distilled a second time from fused carbonate of potash. The quantity of the salt employed, however, is too small; and what is obtained, as shown by its specific gravity .750, is by no means pure. A separate process is now ordered for ethereal oil, which was formerly ordered to be obtained from the residuum of the preparation of sulphuric ether. If this substance is worth being prepared at all, this is an improvement; for, according to Mr Phillips, the oil could not be obtained by the former process.

Alkalina. Under this head are included the various preparations of ammonia and the alkaline active principles, *Aconitina*, *Veratria*, *Morphia*, *Quina*, and *Strychnia.*

In the ammoniacal compounds there is no change. The processes for *Aconitine*, *Strychnia*, and *Veratria*, are of course new. The latter very properly is ordered to be prepared from Cevadilla. The college have put the seeds in their Materia Medica; but these are always sold in the capsules, and they have not given any instructions as to the method of getting them out.

The process for *Muriate of Morphia* requires notice. The college have adopted the plan for procuring the muriate by double decomposition, first suggested by Dr Montgomery Robertson of this city. Instead of using the muriate of lime, however, they have ordered the muriate, or, to use their nomenclature, the chloride of lead; for what reason we cannot pretend to say. We are sure that the muriate of lead can have no advantage as far as this process is concerned, over the corresponding salt of lime. The muriate of lime has been fairly tried, and found quite successful, not only with small quantities of opium, but what is a better test, on the large scale, and in proof of this, we may cite the fact, that nearly 3000 ounces of muriate of morphia have been prepared by this process in Edinburgh by one chemist during the last year, the greater part of which has been sent to London. But, besides having no practical superiority which we can discern, the chloride of lead has positive disadvantages. In the first place, it is a much more expensive reagent than muriate of lime. The London College have ordered it to be prepared by decomposing acetate of lead by muriate of soda, a good enough process we daresay, but the introduction of which might have been avoided altogether, by using the muriate of lime for the preparation of muriate of morphia. In the second place, a most serious objection to the use of the chloride of lead is its sparing solubility, which is more particularly felt when contrasted with the very soluble nature of the muriate of lime. Thus, in the formula of the London College, the chloride of lead for one pound of opium is directed to be dissolved in four pints of boiling water, which, by the way, will hardly suffice for dissolving two ounces of the chloride, which is the quantity ordered by the college. A waste of fuel and of time is here incurred, first in boiling the water, and secondly, in evaporating such a quantity off again, all of which could have been avoided by using muriate of lime, a sufficiency of which might have been dissolved in a few ounces of cold water. There is another disadvantage which is not to be lost sight of; we mean the large size of vessels which would be required for this process. In operating on the small scale, with one or two pounds of opium, this will hardly be so much felt; but no manufacturing chemist could, with advantage, make muriate of morphia, by working on such small quantities, and where, as is generally the case with our makers of muriate of morphia, about a hundred weight of opium is used at once, the size of vessels necessary would be enormous. It would require, according to the proportions of the London College, very nearly 60 gallons of boiling water to dissolve enough of chloride of lead to operate on this quantity of opium, whereas less than 3 gallons of cold water could suffice if muriate of lime were employed. We hold this formula, therefore, to be practically bad; and we can conceive nothing which could have prompted the London College to alter a process so practically good as that by the muriate of lime, except a restless desire to do something new, and to devise some change on the original plan of the Edinburgh chemist. The precipitation of the morphia from the mother water of the first crystallization is a substantial improvement on the original process, for the morphia thus expeditiously saved more than counterbalances the expense of the ammonia.

The process for *Sulphate of Quinine*, which, for chemical correctness, they call *Disulphate*, is so far an amendment of the method usually followed by chemists, that no alcohol is required to be used. The College, however, have materially diminished the value of this improvement by employing, as the precipitant of the sulphuric acid, a *hydrated oxide of lead*, for which a formula is given in another place, ordering it to be obtained by decomposing acetate of lead by *Aqua Potassae*. This, and the ammonia subsequently required to precipitate the quina, might have been spared altogether, as common carbonate of soda worth about twopence a pound answers the same purpose. The dispensing with the alcohol, however, one-fifth of which was always lost, is a decided improvement in the plan, if the College had taken sufficient pains to carry it out in practice.

The processes for *Strychnia*, *Veratria*, and *Aconitina*, though rather troublesome, are good, and if followed out will yield these principles very pure.

Animalia. The purification of animal charcoal by muriatic acid is very properly introduced.

Distilled Waters. No change except the introduction of *Orange flower* and *Elder flower* water.

Cataplasms. The *Cataplasma Conii* and *C. Lini* are new. The former might have been made as well with the leaves, as with the extract diffused through water and thickened with linseed. The extract is more apt than the leaves to be of bad quality.

Cerates. The *Ceratum Hydrargyri Compositum* is new. It is a compound of soap cerate, strong mercurial ointment and camphor. It should be a convenient application to chronic swellings.

Confections. An improvement is introduced here, in ordering the components of many of these to be kept dry, and the liquid part to be added only as they are to be used. By this their tendency to ferment, or become mouldy is avoided.

Decoctions. Several important additions are made here, which will be a great convenience for physicians in prescribing. Of these the chief are, *Decoct. Amyli, D. Chimaphilae, D. Granati, D. Scoparii Compositum, D. Tormentillae, D. Uvae Ursi.* The giving of three separate formulae for the decoctions of the different kinds of *Cinchona* bark, each, like the clauses of an act of Parliament, repeated in the same words, was useless. The ordering distilled water for the decoctions was hardly necessary.

Plasters. Emplastrum Belladonnae is new. *E. Cumini* is very properly expunged.

Enemata are introduced for the first time. They are *E. Aloes, E. Colocynthidis,* prepared with two scruples of the compound extract to the pint of water, *E. Opii, E. Tabaci,* (*Infusum Tabaci* of last edition,) which is too strong, containing a drachm to the pint, and *E. Terebinthinae.*

Extracts. Some new ones are introduced. These are *Extractum Colchici Aceticum,* which we believe is a good preparation. *Ext. Colchici Cormi,* the inspissated juice of the bulbs; *Ext. Digitalis,* a preparation of doubtful utility; *Ext. Pareiræ* and *Ext. Uvæ Ursi,* both of which are much better given in the form of infusion. Three separate formulae are given for the extracts of the three kinds of *Cinchona* all in the same words. The *Ext. Jalapæ* remains unimproved. A simple alcoholic extract, *i. e.* the resin of jalap, would be far better. The *Ext. Lactucæ* is as before. If prepared as there directed, that is, by merely inspissating the juice of the fresh leaves, it is well known to be generally useless.

The *Ext. Anthemidis* and *Ext. Cinchonæ resinosum* are expunged. The *Ext. Hæmatoxyli* might have been dismissed likewise.

Infusions. The following are new. *Infusum Diosmæ, Inf. Krameriæ, Inf. Lupuli, Inf. Pareiræ, Inf. Scoparii, Inf. Serpentariæ, Inf. Valerianæ.* These are convenient for prescribing.

Liniments. No change, except some slight alterations in nomenclature, and the introduction under the name of ***Linimentum Opii*** of a useful mixture of soap liniment and laudanum.

Mellita. No directions are now given for despumating honey, which was a useless process. Mr Phillips has introduced the word despumated within brackets, in his translation of the formulae in this section, as if he thought this necessary. The College properly do not require it.

Metallica. The arrangement and extent of this section are altered. The earths and fixed alkalies being given under the heads of their respective metallic bases, the following changes are worthy of notice.

Antimonii Sulphuretum Præcipitatum is now termed ***Antimonii Oxysulphuretum.*** The process is much improved. In last Pharmacopœia "four times as much sulphuret was ordered as the Aqua Potassæ was capable of dissolving."

The process for *Tartar Emetic*, now called ***Potassio-Tartrate of Antimony***, is again changed. The glass of antimony has very properly been abandoned, and a modification of the old Edinburgh process by the ***Crocus*** has been ordered. It seems questionable if even with the addition of some muriatic acid to the mixture of sulphuret and nitre, as ordered now, the process is really as economical and good as that of the Dublin Pharmacopœia. The latter generally yields the purest crystals with least trouble.

Antimonial Wine and other ***vina*** are again ordered to be made with sherry instead of with dilute alcohol, as in last edition.

The ***Pulvis Antimonialis*** is now termed ***Pulvis Antimonii Compositus.*** Is this more correct or scientific than the old name?

Cyanide of Silver is introduced for the sake of the extempore preparation of hydrocyanic acid. It is ordered to be prepared, the ordinary way, by adding nitrate of silver to dilute hydrocyanic acid.

Liquor Arsenicalis is now termed ***Liquor Potassæ Arsenitis.*** The process is improved. The arsenic is ordered to be used in small pieces, as the powder is liable to adulteration, and ordinary carbonate of potash is very properly substituted for the expensive salt formerly ordered to be made by burning cream of tartar. Though the quantities are altered to suit the new imperial pint, the proportions have been carefully kept the same.

Chloride of Barium and its solution for testing sulphuric acid are introduced. It is ordered to be prepared by acting on the carbonate of baryta by muriatic acid. We think that the nitrate would have been a more convenient barytic salt for the purpose of testing, as its presence in a solution does not interfere with the indications of muriatic acid in the same fluid.

Subnitrate of Bismuth is termed ***Trisnitrate.***

Chloride of Lime is introduced for the first time under the name of ***Calx Chlorinata.*** This article might as well have been placed in the list of Materia Medica, for it cannot be prepared by the apothecary so well, nor so cheaply as it is on the large scale in Glasgow and other manufacturing towns.

Ammoniuret of Copper is now termed *Cupri Ammonio-sulphas.*

The *precipitated Carbonate of Iron*, formerly called *Ferri Subcarbonas*, is now called *Ferri Sesquioxidum.* The change of name here is unobjectionable. The precipitated carbonate was well-known to lose nearly all its carbonic acid in drying, and was, in fact, only oxide of iron with a little carbonic acid still retained. The precipitation by the present process is more complete than formerly, the proportion of carbonate of soda ordered in last Pharmacopœia being too small.

Tincture of Muriate of Iron is now called *Tinct. Ferri Sesquichloridi.*

Ferrum Tartarizatum is now named *Ferri Potassio Tartras.* The process is improved. A hydrated sesquioxide of iron is ordered to be prepared first, and then boiled with the cream of tartar. The product is thus rendered more soluble.

Vinum Ferri is omitted.

Ferrum Ammoniatum is now termed *Ferri Ammonio-Chloridum.* It is now to be prepared by simply evaporating together muriate of iron and muriate of ammonia. Sublimating is now very properly dispensed with.

Iodide of Iron is introduced for the first time. The directions are deficient so far that no instructions are given to prevent the access of air. The use of an iron vessel is not enough to prevent some of the iron from being peroxidated if air is too freely admitted. The *Liquor Ferri Alkalini* is very properly expunged.

The College have dispensed with a formula for purifying *mercury* by distillation. The change of names of *Corrosive sublimate* and *Calomel* have been formerly alluded to. The process for the former is improved by ordering more sulphuric acid and less salt than formerly. In purifying calomel, the washing with solution of muriate of ammonia is very properly abandoned.

The name of white precipitate has been changed from *Hydrargyrum precipitatum album* to *Hydrargyri Ammonio Chloridum.* The process is simplified, Aqua Amoniæ being used at once instead of the carbonate of ammonia and Aqua Potassæ as formerly.

Hydrargyri Oxidum Rubrum, now termed *Hyd. Binoxydum*, is ordered to be precipitated from corrosive sublimate by *Aqua Potassæ*, instead of being formed by the slow action of heat and air as formerly. We should like to know if apothecaries are careful to make any distinction betwixt this and the *Nitric Oxyde of Mercury.*

Bicyanide of Mercury is introduced for the first time, apparently from Mr Phillips's translation, for the preparation of hydrocyanic acid. We cannot, however, find in the Pharmacopœia any process for preparing hydrocyanic acid from this salt; and, in fact, it has no advantage for this purpose over the prussiate of potassa, except where the anhydrous acid is required, which of course is not ordered by the Pharmacopœia.

Two compounds of Iodine and Mercury are introduced, the *Iodide* and *Biniodide.* The former, perhaps, might have been dispensed with, as it is more liable to decomposition. It would have been more easily and uniformly made, and not at a much greater cost, by adding calomel to hydriodate of potassa. The process by precipitation is not so applicable to the biniodide, as a portion is easily redissolved if either of the salts employed in its formation, corrosive sublimate and hydriodate of potash, is in excess.

The *Black Sulphuret af Mercury*, now termed *Hydrargyri Sulphuretum cum Sulphure*, might have been expunged. Mr Phillips is quite right when he says that it is an inefficient preparation.

Magnesiae Subcarbonas is now more correctly termed carbonate.

Acetate of Lead. Litharge is substituted for white lead in the preparation of this salt.

The *Solution of Subacetate*, now termed *Diacetate*, is ordered to be prepared by boiling the acetate with litharge. This makes a more uniform solution, though we question its being more economical.

Chloride and *Hydrated Oxide of Lead* have been already alluded to as superfluities which might have been avoided.

Iodide of Lead is new. It is ordered to be prepared by precipitating the acetate by hydriodate of potassa.

Potassium.—Under this head are included potassa and its salts. The subcarbonate is now termed carbonate, and the carbonate bicarbonate. There is a formula for an effervescing solution of potash corresponding to soda water.

The process for *Liquor Potassae* is improved. It is of greater strength, the spec. grav. being now ordered to be 1063, instead of about 1056, as formerly. It might have been got stronger, by using a still larger quantity of lime than that now ordered; but this is probably strong enough for all practical purposes.

Potassa Fusa is now termed *Potassae Hydras.*

Sulphate of Potassa is to be prepared by igniting the supersulphate remaining after the formation of nitric acid, and crystallizing the solution of the remainder. The product is not so large as formerly, but it is not less economical, for the cost of the carbonate formerly used to saturate the excess of sulphuric acid, was not repaid by the additional sulphate obtained. In crystallizing the bisulphate, some sulphuric acid is ordered to be added, which has the advantage of insuring that none of the salt is resolved into sulphate and sesquisulphate.

Hydriodate of Potassa, which ought to have been in the last Pharmacopœia, is now given under the title of *Iodide of Potassium*. The process for preparng it is practically good, and is, we believe, that which is now most commonly followed by manufacturers. It consists in first forming a solution of iodide of iron, and then decomposing it by carbonate of potassa. The carbonate of iron thrown down should not be rejected, although the college say nothing to prevent this; when washed and dried it is their sesquioxide of iron.

The *Liquor Potassii Iodidi Compositus*, which follows, is a solution of 10 grains of the iodide of potassium, and 5 grains of iodine in a pint of water. It is too weak. Mr Phillips, in a note appended to the table of doses at the end of his translation, estimates the dose of this solution at about a drachm. We suspect an ounce would be nearer an efficient quantity.

By the bye, we should like to know upon what evidence Mr Phillips ascribes the introduction of iodide of potassium into this country to Dr Williams of St Thomas's. It was particularly mentioned by Dr W. Gairdner in his Essay on Iodine, published in December 1823. Did Dr Williams introduce it previous to this?

The greatest novelty among the compounds of potassium is the Bromide, *Potassii Bromidum*, which is ordered to be prepared by a process similar to that for the Iodide. By Mr Phillips we are told, that Dr Williams has used this successfully in cases of enlarged spleen, in doses of three to ten grains three times a day. Has any body besides Dr Williams tried this so as to warrant its introduction into the Pharmacopœia?

Potassæ Sulphuretum is now termed *Potassii Sulphuretum*. The process is improved, one part of sulphur being ordered to four of carbonate of potassa, instead of one to two as formerly, which was very apt to cause it to take fire.

Sodium and its compounds.—The names of the carbonates are changed like those of potash. A formula is given for soda water, *Liquor Sodæ Effervescens*, and for *Liquor Sodæ Chlorinatæ*, equivalent to Labarraque's soda disinfecting liquid.

The class of preparations of sulphur has properly been abolished. The *Sulphuret of Potassium* has been more appropriately placed under the head of that metal, whilst *Sulphur Lotum*, *Sulphur Præcipitatum*, and *Oleum Sulphuratum*, have been abolished, and in the formulæ, as *Emplastrum Hydragyri*, where sulphurated oil was formerly used, its extempore preparation forms part of the process.

The remainder of the Pharmacopœia is chiefly occupied with galenical preparations; and we take this opportunity to remark, that this department is on the whole very superior to the chemical portion.

Mixtures.—Three new ones are given, ***Mist. Cascarillæ Composita***, consisting of infusion of cascarilla, squill vinegar, and paregoric, which is said by Mr Phillips to have been found useful in chronic pulmonary complaints: ***Mist. Gentianæ Comp.*** a good combination of the infusions of gentian and senna, well adapted for dyspeptic cases with constipation; ***Mist. Spiritus Vini Gallici***, an emulsive mixture of brandy, yolks of eggs, and sugar in cinnamon water, to which two drops of cinnamon oil are ordered to be added, which should be unnecessary if the cinnamon water is worth anything. This is intended to be used as a stimulus in typhoid cases; but we doubt if it is more useful, or will be as agreeable to patients, as plain brandy and water. ***Mist. Cornu Usti***, a useless mixture of phosphate of lime, is very properly expunged.

Pills.—The extract of aloes formerly ordered is very properly discontinued, and simple powdered aloes substituted. Treacle is used in several instances to mix the masses, which is an economical substance. The quantity ordered in some of the pills, we have been told, is so great that a sufficiently consistent mass cannot be obtained; but this, we apprehend, must in great measure depend on the goodness of the treacle, which is often very copiously watered by the grocers. The new pills are, ***Pil. Conii Comp.***, a combination of extract of conium and ipecacuan; ***Pil. Iodidi Hydragyri***, containing one grain of the Iodide in five of the mass; ***Pil. Ipecacuanæ Comp.*** a combination of squill pill with Dover's powder; ***Pil. Rhei Comp.***, corresponding with those of the last Edinburgh Pharmacopœia, with the improvement of the addition of a small quantity of soap, and the substitution of oil of Carraway for oil of peppermint; why, we know not, unless it be to avoid uniformity with the Edinburgh College, which it would have been better to have retained as far as possible; ***Pil. Sagapeni Comp.*** a combination of eight parts of Sagapenum with one of aloes. The altered names are, ***Pil. Hydrargyri Chloridi Comp.*** instead of ***Pil. Hydrargyri Submuriatis Comp.*** and ***Pil. Saponis Comp.*** instead of ***Pil. Saponis cum Opio.*** It would have been better, we think, in this case to have retained the name, expressive of the active ingredient, especially as the ***Pil. Styracis Comp.*** which has been resumed again for the first time since 1745, is of equal strength, and, both in respect to name and taste, answers for concealing opium from fidgetty patients.

Powders.—The ***Pulv. Jalapæ Comp.*** of the other Pharmacopœias has been admitted with the addition of two drachms of ginger to nine ounces. The *Pulv. Contrayervæ Comp.*, the *Pulv. Cornu Usti cum Opio*, and *Pulv. Sennæ Comp.* are properly rejected.

Spirits.—Alcohol is to be got from rectified spirit by chloride of calcium instead of fused carbonate of potash, as formerly. The specific gravity is .815. This is strong enough for most, but will not answer for all, purposes of pharmaceutical chemistry. The processes for the ammoniated spirits are improved, a single operation now sufficing for the preparation.

The *Spiritus Colchici Ammoniatus*, and the *Spiritus Ammoniæ succinatus*, are now more correctly placed among the tinctures. Their new names are *Tinct. Colchici Composita* and *Tinctura Ammoniae Composita.*

Syrups, no change.

Tinctures.—*Tinct. Balsami Tolutani* has been readmitted, not having been officinal since 1788. *Tinct. Cinchonae* is now ordered to be made with yellow bark, instead of pale bark, as formerly. *Tinct. Cinchonae Ammoniata* is expunged. *Tinct. Colchici*, from the seeds, *Tinct. Conii*, *Tinct. Cubebae*, *Tinct. Gallae*, and *Tinct. Iodinii Composita*, are all new. The latter contains one ounce of iodide of potassium, and half an ounce of iodine in the pint of rectified spirit.

Tinct. Valerianæ Ammoniata, is now called *Tinct. Valerianæ Composita.*

Wines.—The re-employment of sherry instead of dilute spirit for these preparations, has already been alluded to.

Ointments.—The following are new: *Unguentum Antimonii Potassio-Tartratis*, containing two drachms of tartar emetic in the ounce of lard. We have found an ointment of half this strength quite strong enough for most skins; *Ung. Creasoti*, containing half a drachm to the ounce. *Ung. Gallæ. Comp.* containing a drachm of galls, and fifteen grains of opium in the ounce: *Ung. Hydrargyri Iodidi*, and *Ung. Hydrargyri Biniodidi*, each containing in an ounce one drachm of the respective ingredient: *Ung. Iodinii Comp.* containing fifteen grains of iodine, half a drachm of iodide of potassium, and half a drachm of spirit in an ounce. *Unguent. Plumbi Comp.* made with an excess of chalk mixed with distilled vinegar, and these incorporated with a basis of litharge plaster, softened by olive oil. This should contain acetate of lime and undecomposed carbonate. Mr Phillips says it is used as an application to indolent ulcers. What are its peculiar advantages? *Ung. Plumbi Iodidi*, containing a drachm of the iodide in an ounce of lard.

These remarks on the London Pharmacopœia will perhaps be too detailed for the liking of most of our readers; but we have thought it right to follow the practice pursued on a former occasion, of offering a commentary on the work, which should point out the principal changes which have been made. The number of these must be the apology for the length of this article.

We proceed now to adopt a similar practice with the new Edinburgh Pharmacopœia.

Twenty-two years have elapsed, the College tell us, since the publication of the last edition of this work; a long time certainly, during which pharmaceutical science has made such rapid advances, as to render the present work almost rather a new one than a corrected edition. The differences between this and the last are in many respects striking, one of the most important of which certainly is its being written in English.

Respecting the Latin dress of the London Pharmacopœia, we are glad to find, that the Edinburgh College agree with almost all that we have said on this subject. We quote the following passage of their preface in corroboration of our observations.

> "The time is perhaps gone by when public opinion required as a test of learning that a College of Medicine should write in Latin alone; and it may even be questioned whether the practice be not open to censure as leading to risks of inaccuracy in preparing and compounding drugs. Besides, the favourable reception of unauthorized translations of former Pharmacopœias, together with the slow sale of the last Latin Edition of 1817, seemed sufficiently to indicate the wishes of the profession on this subject, and to show that the Latin language cannot be any longer retained, without occasioning, as of late, serious delays and obstructions in the way of future improvement."—Pp. vi. vii.

The introduction of tests for the purity of the substances forms the next subject of consideration in the preface. The College here claim the credit, of having suggested this to the authors of the London Pharmacopœia. This they are right in doing, as no reference to this is made by the London College. We may take this opportunity to remark that a strange system seems to prevail among Pharmacopœias, of seldom or never acknowledging any of the improvements for which they are indebted to one another. We cannot help thinking that a custom, which is always proper and agreeable amongst individuals, might likewise be observed by public bodies when they become authors. The Edinburgh College gently hint at the imperfections in the tests of the sister body, and tell us that they have endeavoured to carry the plan more fully into effect. There is one feature in the Edinburgh tests which we think deserving of all commendation; we mean their brevity and simplicity. Their aim seems to have been, as far as possible, to demonstrate at once, the presence of the requisite amount of the essential constituent of the drug, and when this has been established, we apprehend that the object of the test has been fully attained. The tests are not limited to inorganic substances and chemicals; notwithstanding the difficulty, they have given some very neat and easily applied means of ascertaining the purity of several vegetable substances. Thus they have given tests for the presence of starchy matter in gamboge, for determining the value of catechu, and the presence of a proper amount of quina in yellow bark, for distinguishing true oil of cinnamon from oil of cassia; for the goodness of leaves and extract of conium; for the purity of copaiba and creazote; for the adulteration of croton oil by castor oil; for distinguishing true from false angustura bark; for the presence of poppy seed or other inferior oils in olive oil; for the presence of a proper amount of morphia in opium; for the purity of scammony, of strychnia, &c.

Among the tests for other substances which deserve notice for their neatness and efficiency, we may quote those for detecting water or alcohol in sulphuric ether, oil of grain in alcohol; supertartrate of potash in tartar emetic, to do which well the proportions given must in every respect be carefully attended to; for the purity and dryness of iodine, for the presence of muriate of soda in hydriodate of potash. For a great many others, very exact tests are given, upon the simple principle alluded to above; and to facilitate their application, the College have directed a series of accurate solutions of some of the most important reagents to be prepared, by the use of which the trouble and difficulty of accurately weighing minute quantities is avoided.

From a subsequent passage of the preface, it would seem, that there had been some discussion in the College, as to the propriety of excluding certain of the chemical preparations, on the ground that they are in great measure prepared by chemical manufacturers, who would scarcely be guided by colleges in their processes. We do not see what chemicals it could have been wished to exclude, for we do not observe many processes which could have been spared. We are sorrow, however, that the College should think necessary to admit, that, in selecting processes, "simple and certain," for the convenience of medical men who may choose to prepare their own chemicals, they should have adopted some which "may not always be either the cheapest or most productive." We apprehend that, in writing a Pharmacopœia for a country like this, where no medical men and few retail druggists think of preparing their own chemicals, the great object should be, to give those processes which would enable the manufacturer to supply pure articles at the cheapest rate. This is, we think, a good illustration of the benefit which would accrue, were our chemists and druggists on such a footing, as to enable them to be associated with our physicians, in constructing a Pharmacopœia. They would materially aid the physicians in that part which relates to chemicals, whilst the physicians would as at present, more especially direct that portion which respects galenical preparations.

The College, as on former occasions, do not give any general directions as to the vessels to be employed in their processes; but they have taken the opportunity to recommend a very neat apparatus for distilling, which is we, believe, an invention of M. Liebig. For its description we refer to page ten of the preface. We may observe, however, that we are doubtful if, in the majority of cases, it will be preferred to the old-fashioned retort and receiver. We have tried both fairly, and we must acknowledge that, for ordinary purposes, as for instance the saving of alcohol in processes of vegetable chemistry, we prefer the latter, as being both more easily put up, and less liable to go wrong. For distilling volatile oils, however, especially when provided with the neat and convenient recipient mentioned in the section which refers to them, we believe the new apparatus to be a decided improvement

With respect to nomenclature, the College have adopted a system, which will, we think, eventually be of great service. Instead of altering the names to suit the theories of the present day, which in all probability would subject many of them to the necessity for another change in a few years, they have adopted a set of short pharmaceutical denominations convenient for prescribing, and not involving any theoretical or scientific distinction, which they intend and hope to render permanent, and which will apply to chemicals, whatever be the theory of their composition, and to vegetables, whatever long new names botanists may invent for them annually. A good many substances, it is true, thus have designations different from those which they bore in last Pharmacopœia; of these the college have given an ample list. The inconvenience, however, which always, more or less, must attend a change of names, will here be slight and only temporary, for the majority of designations adopted, have to a certain extent, been familiar to medical men for some time; and the college have taken care that they are in general so distinct, simple, and comprehensible, that no one can have any difficulty in adopting and applying them. Of these names, which are in Latin, they have given translations, and have appended to them short scientific chemical or botanical definitions, in order to insure accuracy still further. We trust that the decided step which the College have taken with respect to this, will go far to prevent the inconvenient fluctuations of nomenclature, and that the names which substances have now got will be peaceably left to them in entail.

The list of the Materia Medica is so far different from that of former editions, that, besides containing the simples, and the substances which the druggist is to purchase and not to make, it includes many of those for which formulæ are given in the body of the work. This is done for the sake of giving, at the same time, the characters and tests for the purity of the different substances.

The following articles of the Materia Medica are new. We do not include here new preparations, which we shall mention when we consider the details of the Pharmacopœia.

Acetum Gallicum,
Acidum Muriaticum, commercial,
Acidum Nitricum, commercial,
Acidum Pyroligneum,*
Aloe Barbadensis, and Al. Indica, instead of Al. Hepatica,
Althææ Folia,
Amydala Amara,
Anethum, Dill,
Aurantii Oleum, orange flower oil,
Bismuthum,
Bucku,
Calx Chlorinata,
Gambogia (Zeylanica),
Carbo Animalis, Ivory black,
Cassiæ Oleum,
Chiretta,
Cinchona Coronæ, crown bark,
Cinchona Cinerea, grey or silver bark,
Cinnamomi Oleum,
Colchici Semina,
Creasotum,
Crotonis Oleum,
Cubebæ,
Ergota,
Gossypium, "raw cotton," we presume they mean cotton wadding,
Iodineum,
Juniperi Cacumina,
Krameria,
Lauro-Cerasus,
Limones,
Lini Farina,
Lini Oleum,
Linum Catharticum,
Lobelia,
Lupulus,
Manganesii Oxydum,
Maranta,
Nux Vomica,
Origanum Vulgare, substituted for O. Majorana,
Pix Arida,
Potassii Ferrocyanidum,
Pyrola,
Rhoeados Petala,
Sabadilla,
Sago,
Senna Alexandrina and Senna Indica,†
Tapioca,
Taraxacum,
Terebinthina Chia.

The following appear to be the principal articles expunged from the Pharmacopœia.

Amyridis Gileadensis Resina,
Anchusæ Tinctoriæ Radix,
Arctii Lappæ Semina et Radix,
Arnicæ Montanæ Flores et Radix,
Artemisiæ Santonicæ Cacumina. This might have been left.
Boletus Igniarius,
Chelæ et Lapilli Cancrorum,
Cardaminis Pratensis Flores,
Centaureæ Benedictæ Herba,
Cerevisiæ Fermentum,
Coci Butyraceæ Oleum Fixum,
Dianthi Caryophylli Flores,
Dorsteniæ Contrayervæ Radix,
Geoffrœæ Inermis Cortex,
Gratiolæ Officinalis Herba,
Hyosciami Nigri Semina,
Hyssopi Officinalis Herba,
Juniperi Lyciæ Gummi Resina,
Lactucæ Sativæ Herba,
Lact. Virosæ Herba, (Lactucarium is retained).

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* Some of the modifications of acetic acid might have been spared; there are not less than five in the Pharmacopœia. *Acetum Britannicum*, *Acetum Destillatum*, *Acetum Gallicum*, *Acidum Aceticum*, and *Acidum Pyroligneum*.

† These were formerly not distinguished, but included under the common designation of *Cassia Senna*. By *Senna Indica*, the college understands the large leaved or *Tinnivelly* kind, the common East India senna is not acknowledged. It is, however, commonly used as senna in most druggists' shops.

Lauri Cassiæ Flores,
Lauri Nobilis Baccæ et Oleum expressum,
Lauri Sassafras Lignum,
Leontodontos Taraxaci Herba,
Malvæ Sylvestris Flores,
Marrubii Vulgaris Herba,
Macis,
Origanum Majorana, for which O. Vulgare is substituted in the Materia Medica, though Majorana is still indicated in the appropriate chapter for yielding a volatile oil.
Ossa, although burned bones are used in the process for phosphate of soda.
Terebinthina Vulgaris,
Polygoni Bistortæ Radix,
Rhododendri Chrysanthi Folia,
Rhois Toxicodendri Folia,
Ricini Semina,
Rubiæ Tinctorum Radix,
Rumicis Acetosæ Folia,
Sagapenum
Salviæ Officinalis Folia,
Sambuci Nigri Baccæ et Cortex,
Sinapis Albæ Semina; these might have been retained; they are a good stomachic.
Succinum,
Tanaceti Vulgaris Flores et Folia,
Tussilaginis Farfaræ Flores et Folia,
Ulmi Campestris Cortex,
Winteræ Aromaticæ Cortex. To this list they might safely have added Angelica, Centaurium, and Spigelia.

The preparations and compounds are given, like those of the London Pharmacopœia, in alphabetical order, and the arrangement is nearly the same as that adopted by the London College. The advance of pharmaceutical science has caused a great many changes to be made in the processes of the Edinburgh Pharmacopœia of 1817. It will hardly be necessary to point out the whole of these, but we shall notice the most important alterations, taking a brief survey of each section seriatim.

Acids—Acidum Aceticum is ordered to be prepared by the action of sulphuric acid or acetate of lead, instead of having recourse to double decomposition by means of sulphate of iron. The acetate is ordered to be previously fused to expel water, and for this purpose, as well as for the distillation, a fusible metal bath, which is very convenient, is recommended. *Acidum Benzoicum* is to be obtained by sublimation. The former process, by carbonate of soda and sulphuric acid, was inconvenient and unnecessary. *Acidum Citricum*, a process similar to those of the other Pharmacopœia, is now given. Accurate directions are added, to insure that the solution of citric acid does not contain sulphuric acid. *Acidum Hydrocyanicum* is introduced for the first time. The process adopted, is the same as that of the London College, except that a much larger proportion of sulphuric acid is employed. The quantity is more than is requisite to decompose the whole of the ferrocyanide of potassium, but as the expense is trifling it is better to insure this fully. The College have given directions to ascertain the strength of the medicinal acid thus obtained, by its complete precipitation by a given quantity of their solution of nitrate of silver, but they have not stated what per centage of any acid this is meant to indicate, which is to be regretted, as the knowledge of this is the best guide which the physician can have in apportioning the dose of this acid. It is ordered by the Edinburgh as by the London Pharmacopœia, that it shall not contain any sulphuric acid. It might have been allowed to the druggists to add a limited amount of sulphuric acid to this, as it is to the manufacturer in the case of vinegar, for the sake of preservation. Prussic acid is much less liable to decomposition when a small proportion of some mineral acid is present.

Acidum Muriaticum Purum. The salt employed is ordered to be obtained pure by crystallization, which is a simpler and more efficacious method, than the former plan of heating to redness. *Acidum Muriaticum Dilutum* is the same as the London Pharmacopœia; four measures to twelve of water.

Acidum Nitricum Purum. The nomenclature and process here are both improved. In last Pharmacopœia the acid obtained by the action of sulphuric acid or nitre was incorrectly termed *Acidum Nitrosum*, and *Acidum Nitricum*, was ordered to be obtained from this by heating. These two processes are now conjoined, and the product is designated *Nitric Acid.* The proportion of sulphuric acid now used, enables the chemist to obtain a larger amount of nitric acid from the nitre than formerly. *Acidum Nitricum Dilutum* is ordered to have very nearly the same strength as that of the Dublin Pharmacopœia, which is more than three times the strength of the London dilute acid. *Acidum Sulphuricum Aromaticum* is now placed in the same section with other acids, which is more convenient, than having it for theoretical reasons among the æthers, where its name would never lead us to expect it. *Acidum Tartaricum*, the College have adopted entirely the improved London process.

We ought to notice here the improvement in many of the formulæ, more especially those of the section just considered, of substituting, in the case of liquids, measure for weights. This is productive of great convenience.

Alcohol and Ethers.—By alcohol the College mean absolute alcohol of sp. gr. 794–6. This is not required in pharmacy, but it is essential in many processes in organic chemistry, and we have to thank the College for an easy plan of obtaining it. The process consists in adding quicklime to rectified spirit, allowing it to slake thoroughly so as to combine with all the water, and distilling off the spirit carefully. The *Rectified Spirit* is retained in the materia medica and is to be of sp. gr. .838. The Spiritus Tenuior, for which a formula is given in another section, is to have sp. gr. .920 instead of .935, as formerly.

Æther Sulphuricus.—The arrangements suggested for carrying on this process are very complete, but are too long for quotation here. They appear to be calculated to answer well on the large scale. The æther is ordered to be of sp. gr. .735.

Spiritus Ætheris Nitrici.—The process for this is new. The æther is ordered to be prepared first, by the action of seven fluidounces of nitric acid on fifteen of rectified spirits; it is then to be purified by agitation with lime and muriate of lime, and then to be dissolved in four times its bulk of rectified spirit. A very pure and regular preparation will be thus obtained, but we doubt if the hazard of violent action in the first part of the process, and the chances of loss in the purification of æther, will not deter manufacturers from following it. *Æther Sulphuricus cum Alcohole Aromaticus* has been expunged.

Alkalies.—Under this head are included *Ammonia* and its salts, with *Aqua Potassæ*, *Potassa*, and *Pot. cum Calce*. These last, we think, would have been placed more appropriately along with soda and the salts of each, under the head of their respective metallic basis. A very convenient modification of Wolfe's apparatus is described for making *Aqua Ammoniæ*, which should answer well on the large scale. The *Hydrosulphuret of Ammonia* is omitted. The proportions of the materials in the process for *Aqua Potassæ* are improved, less lime is used, by which alteration the portion of the solution which was formerly mechanically retained by the residuum is lessened, whilst at the same time enough both of lime and water is used to insure the decomposition of the carbonate of potash. The product obtained is somewhat stronger than that of the London Pharmacopœia, being of sp. gr. 1792.

Alkaloids and their Salts form the subject of the next section, which is entirely new to this Pharmacopœia. The process for *Muriate of Morphia* adopted is that of Dr Robertson formerly alluded to, and will, we are sure, always be preferred to that of the London College. The College have added a formula for a solution of the muriate, which is equivalent in strength to laudanum, each ounce containing four and a half grains of the salt. The *Acetate of Morphia* is ordered to be prepared by decomposing the muriate by ammonia, and dissolving the morphia thus obtained in a slight excess of pyroligneous acid. We see no reason why they should not have used acetic acid of the Pharmacopœia diluted. It would be much less likely than the pyroligneous acid to give a coloured salt. The process for *Sulphate of Quinine* has the advantage of great simplicity. An improvement of considerable value is introduced, in ordering the bark, previous to its being treated with the sulphuric acid, to be boiled with carbonate of soda, by which a great proportion of the resinoid colouring matters are got rid of, and the obtaining of a colourless salt very much facilitated. The acid solution is then to be prepared, and decomposed by carbonate of soda, a very cheap and abundant substance. The impure quina is thus at once precipitated alone, and the necessity for the use of alcohol is thus superseded without the use of the hydrated oxide of lead and ammonia, which contribute so materially to enhance the expense of the London process. The directions for saturating the quina with sulphuric acid might be somewhat improved. It would have been better to have ordered the sulphuric acid to be previously diluted, and to be added to the water containing the quina, by means of a pipette; in this way the chances of adding too much acid would be very much lessened. The College orders, in the event of an excess of acid having been added, to neutralize with a little carbonate of soda. The obvious objection to this is, that, on evaporating the mother liquors to obtain all the sulphate of quinine, a little sulphate of soda would be apt to be mingled with the last portions. It would have been simpler to have ordered a small quantity of the impure quina to be retained for the purpose of guarding against such an occurrence. In general, however, we believe, that the previous dilution of the acid, and the use of the pipette, will enable the chemist easily to add it with such nicety that neither of these precautions will be required. The processes for *Strychnia* and *Veratria* are both quite simple. The last particularly so, the College not insisting on having the *Veratria* quite pure, although it is obtained quite good enough for all practical purposes. The process consists simply in making a tincture from the sabadilla seeds, which is to be concentrated, and then thrown into a large quantity of cold water. In this way the resinous matter of the sabadilla is precipitated, and is to be separated by a filter. The fluid which contains the *Veratria* in combination with the gallic acid, with which it is associated in the seeds, is then to be supersaturated by ammonia, by which the *veratria* is precipitated.

We regret that the College have not given any process for *Aconitina*, which is becoming fashionable as a remedy, particularly for irritable states of the iris, and for which the London chemists ask an extravagant price.

Conserves and Electuaries. Conserva Amygdalarum has been adopted from the London Pharmacopœia without change. *Electuarium Piperis* is likewise adopted, with the decided improvement of substituting liquorice powder for elecampane root. *Electuarium Sennæ* has been simplified by the omission of the tamarind pulp. *Electuarium Cassiæ Fistulæ*, a useless and expensive preparation, has been very properly expunged.

Decoctions. The following are new: *Decoctum Aloes*, *Dec. Dulcamarae*, and *Dec. Sarzæ Compositum*, adopted from the London Pharmacopœia, *Dec. Haematoxyli*, and *Dec. Taraxaci*, the same as those of Dublin, *Decoctum Scoparii* differing from that of London in containing *Juniper tops* instead of the *Berries*, and

Cream of Tartar instead of *Taraxacum.* This should be a valuable form of diuretic medicine.

The following have been expunged: *Dec. Anthemidis nobilis, Dec. Geoffrœae Inermis, Dec. Hordei, Dec. Lichenis Islandici, Dec. Ulmi Campestris. Decoctum Althaeae* is now given in another section as *Mistura Althaeae.* What was the use of this change? Though it really is a mucilage it is not the less a decoction, and might have been allowed to retain its old name.

Distilled Waters. The following are new: *Aqua Anethi, Fœniculi, Menthae viridis* and *Sambuci. Aq. Laurocerasi* is likewise new. We apprehend that sixteen ounces only instead of a pint should have been ordered to be distilled, in order to make it uniform with the formula of the Dublin Pharmacopœia. *Aqua Citri Aurantii* and *Aqua Citri Medici* have been omitted.

Enemata. This section is entirely new. It contains *Enema Catharticum* made of senna and Epsom salts. *Enema Fœtidum,* the above with the addition of tincture of assafœtida. *Enema Opii, Enema Terebinthinae,* and *Enema Tabaci,* made with fifteen to thirty grains in eight ounces of water, which is, we apprehend, stronger than most people would venture to use at once.

Extracts.—This section comprehends both the extracts and inspissated juices of the last edition. *Extractum Aconiti* is made by expressing the juice, then exhausting the leaves with alcohol and evaporating the tincture along with the juice: this should give a very powerful extract; *Extract. Colchici Aceticum,* the same as that of London, only made with pyroligneous instead of acetic acid; *Extract Colocynthidis;* the compound extract is not given, which we regret, as it acts better than the simple extract, and is less liable to cause griping; *Extract. Digitalis,* the usefulness of which we have already ventured to question; *Extract. Elaterii* seu *Elaterium; Extract. Glycyrrhizæ; Extract. Krameriæ; Extract. Lupuli; Extract. Nucis Vomicæ;* an alcoholic extract, similar to that of Dublin, which we believe to be the most convenient form for administering strychnia internally; *Extract. Opii; Extract. Pareirae; Extract. Quassiæ; Extract. Rhei; Extract* sive *Resina Scammonii,* which is the gum resin extracted by proof-spirit from the matters with which it is generally adulterated, the alcoholic portion then evaporated and the watery solution left in the retort poured off from the resinous part, which is to be washed. This, it appears to us, might have been more simply and readily obtained by using absolute alcohol, but it will hardly be necessary where good scammony can be got. *Extract. Sarzae fluidum; Extract. Styracis; Extract. Stramonii* and *Extract Taraxaci* are likewise new. The following have very properly been omitted: *Succus spissatus Lactucae*

Sativae et *Virosae*, *Suc. Spis. Sambuci Nigri*, *Extracti Hellebori Nigri* and *Extract. Rutae.*

Mellita. Oxymel and the *Despumation of Honey* are omitted.

Infusions.—The following are new, and will be convenient for prescribing. *Infusum Aurantii ; Inf. Bucku ; Inf. Caryophylli* ; *Inf. Chirettae ; Inf. Cuspariae ; Inf. Pareirae ; Inf. Serpentariae ; Inf. Simarubae.*

Metals and their Compounds. This section includes the compounds of the fixed alkalies and the earths arranged under their respective metallic bases.

Antimony.—Antimonii Oxydum is new. It is the sesquioxide of antimony, the old powder of Algaroth, prepared by throwing an extempore solution of muriate of antimony into water, and washing with a weak solution of carbonate of soda. This is a good diaphoretic, one grain of which should be equivalent to six or eight of James's powder. *Pulvis Antimonialis.* The process is unaltered, but the definition given in the list of Materia Medica is incorrect, as no mention is made of the antimonious acid, of which it contains nearly forty per cent. whilst the sesquioxide of antimony, which is called one of its chief ingredients, is present generally only in a very variable proportion, and is very often in hardly appreciable quantity. *Sulphuretum Antimonii Aureum* is the new name for the precipitated sulphuret of antimony, the proportion of Aqua Potassæ is now very properly increased. *Antimonium Tartarizatum* is a familiar and untheoretical name, which has been adopted for Tartar Emetic. The process now adopted is nearly that of the Dublin College, and when well performed, which is easy, it yields quite pure crystals by one crystallization.

Bismuth. Bismuthum Album, is the name adopted for the trisnitrate, which is ordered to be prepared in the usual way.

Copper. Ammoniuretum Cupri, has received the untheoretical name of *Cuprum Ammoniatum.*

Iron.—The preparations of this metal are much improved.

Ferri Carbonas Saccharatum.—This is quite new. It is a precipitated carbonate of iron, which when freshly made and moist, is mixed with sugar and dried. This has the property of preserving it in the active and soluble form of a protocarbonate. It is pleasant to take, and a few grains is the dose, which is an immense improvement over the comparatively inefficient precipitated carbonate of the former Pharmacopœia, which seldom did good except in doses of such bulk as generally to sicken the patient. It is still ordered under the name of *Ferri Oxydum Rubrum*, to be prepared for making *Tincture of Muriate of Iron*, which was formerly made from the black oxyde.

Iodide of Iron and its solution are likewise introduced.

Ferri Oxydum Nigrum.—This is now ordered to be prepared by first making a solution of persulphate of iron, uniting this with a solution of protosulphate, and then precipitating the mixed oxide by ammonia. It is the *Magnetic Black Oxyde of Iron*, and should be more uniform than the *smithy sparks* formerly used. It is a favourite with some practitioners at English watering places; but we question if its superiority is so decided as to warrant a place for it in the Pharmacopœia.

The choice of two ways of preparing sulphuret of iron for evolving Sulphuretted Hydrogen is given. That by the immediate contact of white hot iron and roll sulphur is deservedly recommended in preference.

Another formula is given for a precipitated oxide of iron, under the name of *Ferrugo*, which is adopted to distinguish it from the black oxyde just mentioned. The process essentially consists in forming a sulphate in which the metal is peroxidated by the aid of nitric acid, and from which the hydrated sesquioxide is thrown down by ammonia. This is the preparation of iron which is well known, chiefly as an antidote for arsenic, for which the Pharmacopœia recommends it to be kept in the moist state.

Ferrum Tartarisatum.—The process is on the same plan as the new formula of the London College, except that the *Hydrated sesquioxide* is to be prepared by the process for *Ferrugo* instead of precipitating *sesquichloride of Iron* by *Aqua Potassae.*

Mercury. Hydrargyri Biniodidum, is ordered after being formed, as by the London process, to be crystallized from a strong solution of sea salt, by which a very beautiful and uniform product is obtained.

Calomel has now received the very convenient pharmaceutical title of *Calomelas*, which we trust it may be permitted to retain as long as we live. A little nitric acid is ordered to be mixed with the sulphuric acid, to secure the peroxidating of that portion of mercury which is to be converted into bi-persulphate. The formation of calomel is now prepared at once, instead of using corrosive sublimate and mercury as formerly. The proportion of muriate of soda in this and the process for corrosive sublimate is very properly lessened. Corrosive sublimate is termed *Sublimatus Corrosivus*, a barbarism which we fear will shock our Oxford-bred friends in the South, but which we like, as being distinct and intelligible to all; and with regard to the permanency of which we devoutly entertain the same wish we have already expressed regarding *Calomelas.*

The *Nitric Oxide* of mercury is simply termed *Oxid. Hydrargyri Rubrum*, and the *Ammonio chloride* has been wisely termed *Hydrargyri Precipitatum Album.*

The following have been omitted: *Oxid. Hydrarg. Cinere-*

um, *Acetas Hydrargyri*, *Subsulphas Hydrargyri Flavus*, and *Sulphuretum Hydrargyri Nigrum.*

Lead.—The *Acetate* and *Diacetate* are to be prepared as in the London Pharmacopœia. In the formation of the *Iodide*, *Nitrate* of lead is used, the advantage of which we do not perceive. The *Iodide* is ordered to be dissolved by boiling water and crystallized, which insures its purity. A formula for the *Nitrate of Lead* is given. This salt is used chiefly as a convenient test for tartaric acid over tartrates, and for the above process.

Potassium.—The salts of potassa are given here. The *Acetate* is ordered to be prepared by pyroligneous acid. This we should fear will be apt sometimes to give a coloured salt. *Aqua supercarbonatis Potassae* is now termed *Potassae Aqua Effervescens*. *Potassae Bicarbonas* is prepared by mixing and gently heating together carbonate of potash and carbonate of ammonia. The salt is thus obtained in powder, in which form it is always used. It is not required to be crystallized. *Potassae Carbonas Purum* is recommended to be made by burning cream of tartar. This is unnecessary, except for some chemical processes which are beyond the province of the Pharmacopœia. *Iodide of Potassium* is prepared by the same process as that of London.

Sodium.—None of the compounds of soda require notice, except that *Bicarbonate* is ordered to be prepared by a new apparatus which appears to be very ingenious; but the exact utility or advantage of which we do not readily perceive, except that the salt is obtained in powder, and is not required to be crystallized.

Tin.—*Stanni Pulvis* is now a more appropriate name, and is ordered to be prepared by rubbing melted tin in a hot mortar till it granulates. It is got very uniform in this way.

Zinc.—*Zinci Oxydum* is to be obtained by precipitating a solution of the sulphate by carbonate of ammonia, and heating the precipitate.

The following processes, besides some already mentioned under mercury, have been omitted from the section referring to metals. *Sulphuretum Antimonii preparatum*, *Solutio Sulphatis Cupri Composita*, *Subcarbonas Ferri praeparatus*, *Oxidum Ferri, rubrum*, by roasting the sulphate, *Murias Ammoniae et Ferri Carbonas Zinci Impurus praeparatus*, *Solutio Sulphatis Zinci* and *Solutio Acetatis Zinci*.

Mixtures and *Emulsions.*—*Mistura Acaciae*, which in the London Pharmacopœia means mucilage, is here an almond emulsion. The *Mistura Amygdalarum*, which follows, is the same thing, with a smaller proportion of mucilage. One of these might have been spared. *Mistura Althaeae* is the *Decoctum Althaeae* of last edition. *Mistura Camphorae* is an almond emulsion, containing one grain of camphor in the ounce. This is better than the London Mist. Camphoræ, which contains little more of the camphor than its smell. *Mist. Camphorae cum Magnesiae* is ten grains of camphor, suspended by carbonate of magnesia, in six ounces of water. This is the best camphor mixture of all. *Mist. Creasoti* is a solution of *Creazote* in water, with acetic acid and compound spirit of juniper. We presume that this will answer for any of the thousand and one ailments for which creazote is prescribed internally. *Mist. Ferri Composita*, *Mist. Guiaci*, and *Mist. Hordei* (*Decoct. Hord. Comp.*) are adopted from the London Pharmacopœia. *Mist. Scammonii* is scammony suspended in unskimmed milk, with which it forms an excellent, and as far as scammony will permit it, agreeable mixture. *Mucilage* is ordered to be made with cold water. This is a great improvement, as mucilage so prepared is much less apt to become sour than when it has been boiled.

Ointments, Liniments, and Cerates.—None of these require particular comment. The most important new ones are, *Unguent. Antimoniale*, an ointment of Tartar Emetic, of the same strength as that of London, *Unguent. Cocculi*, a good application to ringworm, *Ung. Creazoti* and *Ung. Iodinei*. The *Linimentum Ammoniae* is three times as strong as formerly, and *Unguent. Citrinum* is ordered to be made by the formula of Mr Duncan of this city, which is fully described in his namesake's Dispensatory.

Under the head of *Oxidifiable Non-metallic Elements* we have processes for purifying *Animal charcoal*, freeing *Iodine* from water, and *Sulphur* from *Sulphurous acid*, besides a very good formula for making *Aqua Chlorinei*. This is produced by the action of sulphuric acid on a mixture of muriate of soda and red oxide of lead in water. The acid combines with the protoxide of lead, sets free an atom of oxygen, which combines with the hydrogen of the muriatic acid disengaged from the salt, and thus evolves chlorine which is taken up by the water. The solution of course contains besides chlorine a small proportion of sulphate of soda. This solution, though the Pharmacopœia does not say so, should be preserved from light, and not kept for any length of time, as it is gradually resolved into chloric and hydrochloric acids.

Pills.—The following are the most important additions and changes: *Pilulae Aloes et Ferri*, made with the sulphate of iron, are new. *Pil. Assafœtidae* correspond with the *Pil. Assafœt. Comp.* of last edition, and are not to be confounded with the *Pil Aloes et Assafœt.*, *Pil. Calomelanos et Opii* contain two grains of calomel, and two-thirds of a grain of opium in each pill. *Pil. Colocynthidis et Hyosciami* is a valuable addition, Colocynth in this combination acts well with less tendency to gripe. *Pil. Digitalis et Scillae*, *Pil. Carbonatis Ferri* (*Saccharati*,) and *Pil. Ipecacuanhae et Opii* are likewise new. The College have substituted *Pil. Opii* sive *Thebaicae* for the old *Pilulae Opiatae*, but have very injudiciously doubled the proportion of opium. This was at all events unnecessary when they had adapted the *Pil. Styracis*, which is almost exactly the same strength as this new pill. Though they have distinctly indicated the change in strength, it will, we are sure, be a source of great inconvenience to practitioners. We are thus deprived of any opiate pill with half a grain of opium in each, and have two with one grain in each. *Pil. Plumbi Opiatae* is a good pill, where an anodyne and astringent are wished to be combined. *Pil. Rhei* consist simply of rhubarb made into a mass with *acetate of potass*, and conserve of roses. This should be a tonic pill, hardly laxative, and not to be confounded with the old *Pil. Rhei Compos.* We fear that the similarity of some of these names will lead to mistakes. *Pil. Carbonatis Sodae* are omitted.

Plasters.—The only additions here are *Emplastrum Ammoniaci et Hydragyri*, and *Empl. Belladonae*, both adopted from the London Pharmacopœia. The *Emplast. Cantharidis Compositum*, an absurd combination of vegetable, animal, and mineral, should have been omitted.

Powders.—The additions are, *Pulveres Effervescentes* (soda powders;) *Pulv. Rhei Compositus*, (the well known Gregory's powder;) and *Pulv. Tragacanthae Comp.* adopted from the London Pharmacopœia. *Pulv. Asari Compositus* is omitted. It would have been well if there had been a formula for seidlitz powders, which are of more value than soda powders.

Spirits.—*Alcohol. Ammoniatum*, *Spirit. Ammoniæ Aromaticus*, formerly *Tinctura Aromatica Ammoniata*, and *Spiritus Ammoniæ Fœtidus*, formerly *Tinctura Assafœtidae Ammoniata*, being all prepared by distillation, are properly placed in this section. The formula for preparing weak spirit, *Spiritus Tenuior*, is also given here. The only other addition is *Spiritus Cassiæ*, which was hardly necessary when *Spiritus Cinnamomi* was retained.

Syrups.—The following are the changes here: *Syrupus Ipecacunhæ* is new. The process is rather complicated. It consists in exhausting the root first with rectified spirit, then with proof spirit, and lastly with water, distilling off the spirits, and adding the watery residue to the syrup. The quantity ordered is far too large; few apothecaries would like to prepare seven pints of this syrup at a time. The further additions are, *Syrupus Rhamni*, *Syrupus Rhoeados*, and *Syrupus Sarxæ.* The first of these is only fit for cattle, the second is only good for its colour; neither are very important or useful additions. The process for *Syrupus Sennae* is now very good. The former syrup hardly purged except by disordering the stomach. The present process consists in making a strong infusion of senna, and thickening this with treacle previously evaporated to nearly a solid consistence. It, is we believe, an invention of Dr John Gairdner of this city. The *Syrupus Dianthi Caryophylli* and *Syrupus Colchici* have been expunged.

Tinctures. A very interesting improvement is made in this department by the introduction of percolation as a means of making these preparations. The meaning of this term is too well understood to require explanation here. It appears in most cases to be very advantageous; but there are some substances which do not permit the passage of the alcohol readily through them. These the College have indicated. They have, however, very properly granted to apothecaries the alternative of making their tinctures by the old process of maceration.

The following are new: *Tinct. Aurantii, Tinct. Bucku, Tinct. Capsici, Tinct. Cardamomi Compos., Tinct. Cassiae, Tinct. Colchici*, from the seeds. *Tinct. Iodinei*, containing half a drachm in the ounce. *Tinct. Lactucarii, Tinct. Lobeliae*, and *Tinct. Lobeliae Aetherea.* The process for making *Tinct. Opii* is altered. The opium is first to be digested in warm water, the fluid expressed, and the residue treated by proof spirit for twenty hours. The spirit and water are then to be mixed and strained. In this way a pretty uniform tincture should be obtained. *Tinct. Quassiae Composita* is likewise new.

The following have been omitted: *Tinct. Aloes Aetherea* and *Tinct. Hellebori Nigri. Tinct. Saponis Camphorata* and *Tinct. Saponis et Opii* are given in the section on liniments, &c. under the names of *Linimentum Saponis* and *Linimentum Opii*.

Troches. Correct formulæ have been introduced for the following popular lozenges: *Trochisci Acidi Tartarici, Tr. Lactucarii, Tr. Morphiae, Tr. Morphiae et Ipecacuanhae* and *Tr. Bicarbonatis Sodae.* These, with the exception of the first, it was important not to leave at the discretion of the confectioner. *Trochisci Nitratis Potassae* have been omitted.

Volatile Oils. The chief point worthy of interest in this section is the apparatus recommended. The College advise the use of the distilling apparatus mentioned in the preface, and of the recipient, formerly alluded to, the description of which we do not think it necessary to quote, but which is very simple, and very effectual in separating the volatile oil from the water which distills over with it.

In the case of oils heavier than water, we apprehend that the best way is to allow the products of distillation to rest, and to draw off the water with a simple syphon. In distilling volatile oils on a small scale it is difficult entirely to separate the oil from the water by mechanical means without some loss. When the oil is valuable the whole may be obtained perfectly free from water by distilling from muriate of lime. The College, however, have not thought it necessary to recommend this.

The volatile oils introduced for the first time are those of ***Ruta Graveolens*** from the flowers, the Dublin College order it to be obtained from the herb when in flower; all the parts of the plant yield it, and surely restricting it to the flowers was unnecessary; ***Anethum Graveolens, Carum Carui, Foeniculum officinale***, and ***Piper Cubeba***, from the fruit; ***Mentha Pulegium*** and ***Mentha Viridis*** from the herb; and ***Oleum Copaibae*** from the balsam. ***Lavandula vera*** is properly ordered instead of ***Lavandula Spica*** to yield oil of lavender. The preparations of ***Oleum Succini*** are very properly omitted.

Vinegars. These are properly placed in a separate section instead of associated with the acids, as in the London Pharmacopœia. The new ones are, ***Acetum Cantharidis***, which, like that of London, is we think too weak, and which, we suspect, is not much improved by the addition of Euphorbium; ***Acetum Colchici*** adopted from the London Pharmacopœia, and ***Acetum Opii*** from that of Dublin. This last is a valuable preparation, and is nearly equivalent to Battley's *Liquor Opii Sedativus.*

Wines.—The only addition here is ***Vinum Colchici*** from the bulbs. This preparation is preferred by many practitioners, but it is not, we believe, so good nor so uniform as the wine or tincture prepared from the seeds. The formula is the same as that of London.

The last section is a short but valuable one, comprehending the substances and solutions to be used as *tests.* The formulæ there given are for *Oxalate of Ammonia* and *Nitrate of Baryta* and for testing solutions having a determinate strength, of *Nitrate of Silver, Ammonio-Nitrate of Silver, Nitrate of Baryta*, and *Phosphate of Soda.* The precision and accuracy of these solutions render their application as tests, of the utmost facility.

Our readers will, we dare say, be glad to find that these remarks are closed. Our apology for the prolixity of this article must be, the extent and variety of change which has been made on both the Pharmacopœias, especially that of Edinburgh.

In now taking a comparative review of these two works, we do not hesitate to say, that we think the Edinburgh Pharmacopœia decidedly the better of the two. Its superiority, in our view, consists in its English language, its plain, and, we hope for the future, permanent nomenclature, the superiority of many of its chemical processes, especially those relating to vegetable substances, and, above all, the far greater simplicity, accuracy, and applicability of its tests for the purity of the medicines. With respect to galenical preparations, we have already said that the London College have introduced many excellent and valuable formulæ, for which, we are sure, that they deserve well of the profession, and to whose value the Edinburgh College have borne ample testimony by the number which they have adopted into their own Pharmacopœia.

Whilst we give the Edinburgh College of Physicians full credit for the excellence of the work which bears their name, it would be unfair in us, possessing the local information which we do, not to express our conviction that a great part of its value is due to the labours and exertions of its accomplished President, Dr Christison. It is, indeed, fitting that the President of a College of Physicians should be a man of acknowledged scientific eminence, and especially, that, when the body over which he presides publishes a new Pharmacopœia, he should be both competent and ready to take a principal share in its formation. We are certain that we do not, in any respect, depreciate the merits of the other members of the Edinburgh Pharmacopœia Committee when we say, that we believe that the greater part of its excellence is owing to Dr Christison's scientific knowledge, laborious manipulations, and indefatigable research into the works of British and foreign Pharmacologists.

Art. VI.—*A treatise on Neuralgia.* By Richard Rowland, M. D. London, 1838. Pp. 173.

Dr Rowland has presented us with a treatise on Neuralgia, containing nothing new either as to the pathology, causes, or treatment. The illustrative cases which he gives at the end of the work, and which occurred in his own practice, are neither interesting from their peculiarities nor for their treatment; and after having read over the work with some attention, we were rather at a loss to discover the author's object in publishing it. The work has certainly no pretensions to originality, nor can it be regarded as a clever compilation. The author treats his subject in the usual manner, as symptoms, causes, seat, pathology, diagnosis, prognosis, treatment, &c.; then in detail the different forms of the disease, and lastly, a few illustrative cases.

ART. VII.—*Outlines of Human Physiology.*—By WILLIAM PULTENEY ALISON, M. D., F. R. S. E., Fellow and late President of the Royal College of Physicians, Edinburgh; Honorary Fellow of the King and Queen's College of Physicians in Ireland; Professor of the Institutes of Medicine in the University of Edinburgh; and one of the Physicians in Ordinary to Her Majesty in Scotland.

AT the first foundation of the chair of the Institutions of Medicine, or what was occasionally termed the Theory of Physic, in the University of Edinburgh, in 1741, Dr Whytt the first Professor, made his course consist of physiology and general pathology, and therapeutics, or a view not only of the functions of the human body in a state of health, but of the deviations which they were liable to undergo in disease, and of the principal circumstances under which these deviations took place; and a general view of the external effects produced, and of the means to be employed for obviating or removing them.

This plan of communicating the knowledge of the principles of medicine was imitated from the foreign teachers, more especially from Boerhaave, who was conceived not without justice, to be the great authority in the method of teaching the science of the art of healing. Boerhaave had already published for the use of his auditors, a system of the Institutiones of Medicine, in which he arranged, after the example of his predecessors, the whole subject under five general heads; PHYSIOLOGY, or the knowledge and explanation of the animal economy, and the laws by which its actions are regulated; PATHOLOGY, or the general doctrines of diseases, their differences, their causes, and their effects: SEMIOTICS, or the doctrine of symptoms, or the general consideration of the symptoms of health and disease: HYGIENE, or the doctrine of the preservation of health, containing prophylaxis and the diet necessary to insure longevity; and THERAPEUTICS, or the method of curing diseases, the consideration of the indications pointed out or suggested in different morbid states, and a general view of the remedies or curative means and agents, by which different indications were to be fulfilled, *

This treatise was so excellent and complete in all its parts, that Haller spent several years of his active life in expounding, illustrating, and enforcing the principles contained in it. The example of Dr Whytt was followed by Dr Cullen, his successor, in the same chair; and we possess in his valuable, though short outlines of the first part of the Institutions of Medicine, viz. the Physiology, recently republished with his works by Dr Thomson, sufficient information regarding the method in which Dr Cullen communicated to his pupils the knowledge of what may be termed the first principles of medicine.

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* Institutiones Medicæ in' usus Annuæ Exercitationis Domesticos Digestæ Ab Hermanno Boerhaave. Lugduni Batavor, 1713, 1723. Nova Post Tertiam Lug. Bato. Editio caeteris auctior et emendatior, Venetiis 1757. The latter was published near twenty years after his death, which took place on the 23d September 1738, when he was nearly in his seventieth year.

After stating that the teaching of physic had been for a long time past divided into the Institutions and the Practice of medicine, or the application of the art to particular diseases and persons, Dr Cullen adds, that, according to the general opinion of physicians, before considering the practical applications to particular diseases, it was necessary to premise certain general doctrines, which are called the INSTITUTIONS OF MEDICINE. These, he distinguished into three parts; the first treating of life and health, PHYSIOLOGY; the second delivering the general doctrines of diseases, PATHOLOGY; and the third delivering the general doctrines concerning the means of preventing and curing diseases, THERAPEUTICS. The department of the division of Boerhaave and his predecessors called HYGIENE, he omitted as a separate division, not because it is not an object of the physician's art, but because, as it consists in knowing and avoiding the remote causes of the disease, whether predisponent or occasional, part necessarily falls under the division of PATHOLOGY called ETIOLOGY, and part falls under the general doctrines of THERAPEUTICS. The department also styled SEMIOTICS which formed one of the five divisions of the older writers and teachers, he also rejected as a separate head, because properly speaking, it arranged itself under that division of pathology, where the symptoms of diseases are explained, and coincided, consequently, with the general symptomatology of various authors.

Of this plan of instruction in the Institutions of Medicine, Dr Cullen completed only the first part, viz. the physiology; for though he introduces many illustrations and proofs derived from the phenomena and effects of disease, yet, as these are all intended to illustrate and enforce his doctrines on the state and properties of the body in its healthy condition, it is impossible to regard his short treatise in any other sense than as a neat and luminous exposition of the functions of the living body as in health. What his doctrines in Pathology and Therapeutics actually were in his lectures, and what they would have been had they been published, may be easily understood by those who study carefully his First Lines, and the Lectures on the Materia Medica, both of which works contain, doubtless, the most complete system of philosophical Pathology and Therapeutics, which the profession had yet witnessed. To those who are desirous to understand and appreciate the judgment, genius, and general ability of this great physician, we would recommend an attentive perusal of his whole writings, as published in 1827, by Dr Thomson, and especially the separate perusal of the Institutions of Physiology and the Materia Medica.

The method of Dr Cullen was adopted and improved, and completed by his successor in the chair of Institutions, the late Dr James Gregory. Distinguishing the subject into the three divisions, established by Cullen, Dr Gregory combined the Physiology with the Pathology, so as to form the first part of his course, and made the Therapeutics the second or concluding part a division by itself. The former was first published in 1780, and the whole work appeared in 1782 under the title of *Conspectus Medicinae Theoreticae*, a work which is well known to have passed deservedly through many editions, whether we consider the elegance of the language in which it is composed, or the clear, terse, and succinct manner in which the doctrines of physiology and pathology, as taught at the time, are expounded. The method of instruction thus devised by Dr Whytt and Dr Cullen, and afterwards completed by Dr Gregory, was imitated by Dr Duncan, Senior, who, however, only published outlines of his course of lectures.

When Dr Alison succeeded to the chair of the Institutions of Medicine, he adopted to a certain extent the general principles of the method, but modified them much as the progressive changes in teaching, and the advancement of medical knowledge demanded. From a variety of causes the doctrines of General Therapeutics have been gradually, but steadily tending to fall under the cognizance of the Professor of Materia Medica; and at present it constitutes an integrant part of his course. When, therefore, Dr Alison undertook the publication of a work to assist the pupils of the University of Edinburgh, in the study of the Institutions of Medicine, he confined the attention of his reader to the two subjects of Physiology and Pathology, leaving the subject of Therapeutics to be studied by itself. Another innovation rendered almost if not altogether indispensable, by the advancing progress of medical science, and perhaps also by a due regard to perspicuity in the method of teaching, Dr Alison was led by experience to adopt as most effectual in communicating clear and distinct ideas of the two divisions of medical knowledge, which he was engaged in teaching. Dr Gregory we have seen united the facts, reasonings, and deductions of Physiology with those of Pathology. This connection Dr Duncan separated, and Dr Alison in like manner found, that the only mode of communicating clear ideas on the nature of the actions, properties, and functions of the living body in the state of health, was first to explain them in successive and uninterrupted order, and then to give in a separate and subsequent part of the course a short view of the characters, phenomena, and effects of diseased action, the causes by which they are produced, the circumstances wherein they differ, and the external symptoms by which their presence is indicated.

In our thirty-sixth volume, we gave a short account of the first part of Dr Alison's Treatise, devoted to the Outlines of Physiology, as it appeared in 1831; and we have always had it in view to give a fuller notice of the whole work when it appeared in its completed form, embracing Outlines of Physiology, and Outlines of Pathology. This took place in 1836.* The work might then be regarded as presenting a full though compendious view of the Institutions of Medicine, as taught in the University of Edinburgh; or, in other words, those elementary principles of medical science, the knowledge of which is requisite to enable the physician to recognize the presence, degree, and extent of disease, to know its tendencies, and adopt such practical measures as are requisite to counteract its effects, if tending to disorganization. We regret that many circumstances have concurred in preventing us from carrying into effect the intention now mentioned. It is not, however, too late to say that the Outlines of Physiology and Pathology of Dr Alison, is a work not only highly valuable to the pupils of the Edinburgh school, as presenting in a concentrated and commodious form, a methodical digest of the most essential and important facts and inferences constituting the Theory or Institutions of Medicine; but it is also a treatise which all medical readers of every denomination will peruse with advantage, and from which even the most experienced practitioners will derive much useful instruction. It is our opinion, indeed, that the Pathological part of the volume is perhaps the most useful of the two, as it contains the most philosophical and most compendious views we know in the English language, of that species of information which is most directly useful to the practitioner of the healing art. It enables the student to perceive the object of all his previous studies, and shows him how he is to apply the information presented by the elementary sciences of anatomy, physiology, and morbid anatomy to the great purpose of his life,—the recognition of the presence, and the means of conducting successfully the treatment of disease.

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* Outlines of Physiology and Pathology; with Supplement. By William Pulteney Alison, M.D., F.R.S.E., Fellow of the Royal College of Physicians, and Professor of the Institutes of Medicine in the University of Edinburgh.

Another change, however, in this department of medical education requires to be noticed. Partly since the original projection of the work of Dr Alison, and partly since the appearance of that work in its completed form, a considerable change in the didactic duties of the chair has taken place. The institution of the chair of General Pathology in 1831, and since that period, its admission into the Curriculum as requisite to the education of candidates for the degree of Doctor of Medicine, committing to one separate teacher the duty of teaching the general doctrines of Pathology, has furnished the students of the University of Edinburgh, with the means of devoting to the study of General Pathology a more complete and less divided measure of attention, than it was possible to do, when the science was taught as part of the course of Institutions of Medicine. This arrangement also enabled the Professor of the Institutes, to devote a larger proportion of his course to the subject of Physiology alone. As to that of Pathology, he generally devoted at least fifty lectures, the time occupied in which would now be applied to the duty of explaining the history of the functions of the living body in a state of health only.

It is not to be denied that this method presents various advantages which are either imperfectly obtained, or altogether withheld by the other method of combining the two sciences. Physiology, that is the study of the whole of the functions of the living body in a state of health, is a science of such vast extent, deriving its materials from so many different sources,—embracing so many isolated, and sometimes contradictory classes of facts, and presenting so many complicated and difficult inquiries, that to present a just and useful view of it, may well require a full course of lectures of six months' duration, or even a longer space, did the period assigned for professional education allow. In this point of view, therefore, the mere physiological department of the course reaps the advantage of a decided benefit. It is rendered more full and perfect; the lecturer has an opportunity of explaining the difficult and obscure portions of the subject with more care and attention, and in greater detail; and the student enjoys the advantage of forming clearer and more correct notions on many points, on which want of time might oblige the teacher and the author to rest satisfied with hasty, vague, and superficial statements and inferences, which, considering the great proneness to misconception on the part of many pupils, might lead to mistaken notions on many of the laws which regulate the functions of the animal economy. Such inconveniences, if actually resulting from the former arrangement, are likely to be obviated altogether in the present.

In publishing a new edition of the Outlines of his Lectures, Dr Alison has kept this arrangement in view. He confines his present work exclusively to the subject of Physiology; and though every one who takes interest in the progress and improvement of pathological knowledge, must regret the want of a compendious view of the latter science, from a physician who has devoted so much attention to it, and who is in every sense so well qualified to explain the principles and laws of morbid action; yet all who are anxious to form clear and precise notions on the ascertained facts in physiology, will be happy to see the present work, exhibiting as it does in a short compass, a correct and comprehensive view of the present state of physiological knowledge.

It comes not within the object of this notice or the usual plan of this Journal, to examine in detail works of the nature of that before us. It is merely requisite to specify its prominent and distinguishing characters.

In a science embracing so many different divisions, resting on so many facts and classes of facts, and from the nature of the objects with which it is conversant,—facts so difficult to be ascertained and liable to so many sources of fallacy, and, above all, where even the inferences deduced are sometimes liable to be perverted or overstrained, the first and principal object is to draw a clear and visible line of distinction between the facts ascertained and the facts not ascertained, and to arrange them in methodical order, and the second is to present the deductions and inferences to which they legitimately lead. This is the method which Dr Alison has adopted, and to which he has adhered, as far as is practicable, throughout the volume. The physiological reader will find the facts stated with great accuracy and precision, and only those facts which are entitled to that valuable character; and then he is taught the various inferences and deductions to which they lead, and the degree of evidence by which these deductions are supported.

As there is no department of medical knowledge in which logical precision is more required than this, none in which it has been less carefully and strictly employed, and none in which it is more important for the student to be taught to think and reason for himself, the present volume may be confidently recommended as the best suited for this purpose at present extant in the English language.

The first or preliminary chapter presents a just and philosophical view of the objects of physiological inquiry, the mode of conducting the study of the science, and the nature of the evidence required for the conclusive establishment of its principles.

In the second chapter the author gives a very philosophical exposition of the most general laws of vital action, and explains and enforces the peculiarities of vital action as distinct from those of mechanical and chemical action, in a manner which will be approved by all those who have studied most carefully the nature of the actions of living bodies.

In the other portions of the work, the physiological reader will find in the fourteenth chapter on the Mental Faculties, in the fifteenth, on Voluntary and Instinctive Motion, in the sixteenth, on the Involuntary Action of the Mind on the Body, and in the seventeenth on Sleep, most correct and instructive views on these obscure and difficult subjects. These we specify, not because throughout the whole treatise the different divisions of physiology are not expounded with great ability and fidelity, but because, as these are subjects of peculiar difficulty, and have given rise to various discussions, and much erroneous and fanciful speculation, and have very rarely been treated by Physiologists with the clearness, and correctness, and sound philosophical views which are most urgently demanded, it is so much the more agreeable to find them explained and discussed in such a manner that the Treatise may be confidently recommended as a safe and able guide to the young physiological inquirer.

Art. VIII.—*The Transactions of the Provincial Medical and Surgical Association, Instituted* 1832. Volume VII. London and Worcester, 1839. 8vo. Pp. 572.

It gives us much pleasure to observe the Transactions of this Association proceeding with spirit and energy, regularity and great steadiness. Each volume contains extremely valuable and instructive papers; and from the number of able essays and memoirs which the Association has already succeeded in collecting from the members, little doubt can be entertained that, in no long time, they will constitute a body of professional information and valuable statistical documents not inferior to any in the Kingdom, and, in certain respects, not paralleled by any on the Continent.

We regret that our limited space has prevented us from giving such accounts of the labours of this Association as we wish, and as they deserve. But we recommend them strongly to the attention of the profession.

We hope the members will proceed with the same spirit and energy by which their career of useful exertion has been distinguished.

PART III.

MEDICAL INTELLIGENCE.

PHYSIOLOGY.

Experiments proving the existence of a Venous Pulse independent of the Heart and Nervous System, with Remarks on the Contractility of Veins in general. By J. J. Allison, M.D. (American Journal of the Medical Sciences for February 1839.) Dr Allison has published a most interesting and elaborate paper, which appears to put beyond the possibility of doubt the fact, that the *venæ cavæ* and pulmonary veins have pulsations distinct from those produced by a reflux of blood from the auricles; and that this pulsation continues for many hours even after the separation of these vessels from the heart and body.

He mentions, that pulsation of the *venæ cavæ* had been noticed more than two hundred years ago in dogs by Walæus, and also in reptiles by Spallanzani, but that this discovery of Walæus had been overlooked by modern anatomists, having been quoted only by Bartholin, Lancisi, and Senac. He remarks, however, that pulsations of the *venæ cavæ* in their natural state had been seen by Steno, Lower, Wepfer, Borrichius, Whytt, and Haller. He notices also the opinions of modern physiologists with regard to the vital force or contractility of the veins, stating their opinions on this point at considerable length; and after shortly remarking that the venous pulse has been recognized by certain morbid conditions of the system, proceeds to detail a few of the experiments by which he arrived at the conclusions above referred to.

In his first experiment the heart of a frog was cut out, including the bulbous aortæ and the roots of the *venæ cavæ*, no vessel being secured. The pulsation of the pulmonary veins continued five hours and a quarter. The pulsation undulated from the bronchial towards the cardiac extremity of the vessels. The muscular system lost its excitability to galvanic stimuli two hours after the commencement of this experiment.

In the second experiment, where the heart was also removed and the *venæ cavæ superior* alone observed, it was found pulsating at the rate of from 60 to 80 pulsations per minute for eight hours.

In the third experiment, ligatures were passed around the pulmonary veins of the left side of a tortoise, which intercepted the flow of blood. The pulsation of the veins continued, however, at 32 per minute, which they had been before being tied. During such contraction the vessels were extended with some force towards the heart; when the veins were, however, cut through between the ligature and heart, this locomotion ceased, though the pulsations continued 36 to 40 per minute, that of the auricle being only 20. The same phenomena were observed in the veins of the right side. Seventeen minutes after tying the left vein, a ligature was thrown around the aorta, and the heart cut out, and after which the pulsations of the left veins was 48, that of the right 36, while that of the heart was only two per minute. On mechanical irritation the pulsations rose to about 48 one hour after the removal of the heart, at which time the heart had lost all motion. The collapsed extremities of the veins did not pulsate simultaneously with the portion beyond the ligature. Three hours from the commencement of the experiment, the animal was perfectly flaccid and died, but the veins continued to pulsate as before, and motion was observed for eleven hours in the pulmonary veins.

The fourth experiment was similar in its results to that above related.

In the fifth experiment, the heart of a tortoise was exposed, and found to be beating 10 or 12 times per minute. The pulmonary vein on the right side was cut without being tied, and immediately retracted nearly an inch,—a circumstance which always takes place. For three minutes no motion could be observed, but very soon after one or two feeble contractions, a powerful contraction followed, which, like that of an artery, propelled the blood at its orifice to the distance of an inch, the pulsations being 7 or 8 per minute, the blood continuing to be injected in jets for some time. The veins were still beating at the twelfth hour.

In the sixth experiment, a portion of the right pulmonary vein had two ligatures cast around it so as to include a portion of blood between them, and after a little time it was removed from the body. It continued to contract and dilate alternately, like the auricle, at the rate of from 28 to 32 pulsations per minute three hours after being removed. Four hours after the commencement of the experiment, it still could be excited to contraction by stimuli, and their beat as strongly as ever. Eight hours afterwards all motion was gone. "Thus a section of a vein taken from the body pulsated of itself vigorously during a period of four or five hours, and retained its excitability for about eight hours."

About an hour and a quarter after the commencement of the last experiment, a portion of the left vein was also cut out, but only one ligature applied, so that the blood escaped and the portion of the vein was flaccid. Contractions were not observed for five minutes, when they were renewed, but languidly, and at the end of ten minutes could only be renewed by the aid of galvanic stimuli, which continued to affect it for some time longer.

The seventh experiment was made on the body of a half-drowned cat. When the chest was laid open, the heart still beat languidly. One hour and twenty minutes afterwards the superior cava was still pulsating, and was included within two ligatures. In ten minutes longer the pulsations were weak, and only one or two per minute, but they were still excitable by stimuli for forty minutes after this, and would probably have continued longer had not the vessels become collapsed from the escape of the blood.

In the eighth experiment, where a portion of the vena cava inferior of a rat was included between two ligatures and separated from the body, slight contractions were observed for a period of nearly two hours.

In the ninth experiment a cat was drowned, its chest opened, and ligatures thrown around the roots of the great vessels of the heart; they were then separated from that organ, and the whole pulmonary apparatus removed from the body, carrying along with them the *venæ cavæ* and the pulmonary vessels. Thirteen hours afterwards the pulmonary vessels were pulsating vigorously; were still active five hours after that; and could be stimulated two hours after this last period. "Thus the venæ cavæ and pulmonary veins pulsated twenty-one hours after they had been removed from the body!"

In the tenth experiment, nearly the same was observed in the pulmonary veins of a kitten. For nearly thirty hours they retained their irritability, and at that period could be made to contract on the application of stimuli; the *venæ cavæ* having long before ceased to be capable of excitation.

Dr Allison remarks, "not only have we seen pulsations of the *venæ cavæ* and pulmonary veins in several hundred dogs, cats, birds, reptiles, and fishes, in the young and adult; but in the bullock itself, after the vein was separated from the heart, we have noticed evident contractions of its muscular fibres, which are very evident in this animal, yet the heart itself was not removed from the body till the animal had been skinned and the abdominal viscera torn out.

Dr Allison has never been able to detect any thing like pulsation or contraction in any other veins excepting in the pulmonary veins and the venæ cavæ, this power not extending even to their branches. He is of opinion, indeed, that such a structure is not to be expected, seeing that the veins are provided with valves, or are under the influence of the muscles. But he has no doubt, that this alternate contraction and dilatation must exert a considerable influence in promoting the circulation of the blood.

Contributions illustrative of the Functions of the Cerebellum. By John D. Fisher of Boston, M.D.—(American Journal of the Medical Sciences, February 1839. The three following cases appear to establish the fact of the influence of the cerebellum over the generative functions; at least they appear to prove the strong relation which exists between that portion of the cerebral mass and the organs of reproduction.

D. O., aged 45, a book-keeper of intemperate habits, died from an attack of pneumonia. It was remarked soon after that the testes were awanting, but he grew up to the age of puberty without exhibiting any peculiarities to distinguish him from his fellows. From that period, however, to the day of his death, he presented the following peculiarities.—His voice remained unchanged in tone, and was decidedly effeminate. He had no beard, and was never known to shave. He never exhibited any amorous propensities or desire for female society. His body was examined after death, when the following peculiarities were observed. The penis was very small, not larger than that of a boy not yet arrived at puberty. The glans was with difficulty uncovered, and the urethra was of exceedingly small calibre. The scrotum was soft and flabby, but contained no testes. The dartos and the tunica vaginalis were of the natural appearance, but no testes nor any bodies of a glandular nature existed in the scrotum. In the upper part of the left tunica vaginalis, the spermatic cord was observed to extend into its cavity about half an inch, terminating abruptly. The cremaster muscle extended beyond the cord, and spread over the tunica vaginalis. The cord itself was small; the vas deferens terminating in a cul de sac; the arteries and veins were exceedingly small, hardly distinguishable. The vesiculæ seminales were not examined.

It was regarded as a point of great importance to examine the brain, which accordingly was done. The brain was healthy and of a large size; it weighed fifty-one ounces and a half; the cerebrum weighing forty-seven ounces; the cerebellum four ounces and a half; so that the cerebellum was to the cerebrum as one to ten and a half. According to Meckel and others, the average weight of the brain is three pounds, the weight of the cerebellum being to that of the cerebrum as one to seven, or one to eight. So that in this person the cerebellum was one-third less than is natural in the case of an adult male, and was exactly of the weight of that of a female child six years old, examined about the same period.

T. P. B. aged 41, was struck with great force on the back of the head and neck from an accident on the railway; he was at first insensible, but soon regained his intelligence. On examination it appeared the force of the blow had been expended on the mastoid process and on the inferior portion of the occiput bone, and also over the first and second vertebræ of the neck. He gradually recovered. He, however, about the fifth week after the injury, discovered that he had lost the desire and physical power for sexual intercourse, and that no amorous sentiment or the approach of a female could excite it; and this continued in spite of various remedies for nearly two years, and was only partially restored at the end of two years and a half.

Mr ——, aged 73, is married and has children, about four years ago was seized with excruciating pains in the head, followed by dizziness and other unpleasant symptoms. Two years ago had an attack of hemiplegia of the right side, and had had other two attacks since. Since then he has had a *morbid salacity*, which increased till about three months ago, when the desire became imperious only once or twice during the night, without the ability to gratify it, owing to the imperfect erection; for the last year there has been no seminal emission. His mind has been imbecile for the last year, and he died in a state of stupor.

On examining the head, the brain was found healthy, excepting the following appearances. The left lobe of the cerebellum was about one-fifth smaller than the right, the greater portion of its under surface being in a remarkably collapsed state, hollowed in, as an organ usually appears externally when there has been any great loss of substance within. An incision having been made through this collapsed portion, it was found that the whole substance of the lobe below the crus cerebelli was destroyed, leaving merely parietes of a line or two in thickness of cerebral substance. The sides of this large cavity were in contact, connected here and there by a soft delicate rusty-brown coloured substance. The cavity probably contained serum, though none was found when it was laid open. The crus cerebelli had a dull yellowish colour, and was considerably firmer than natural, and in its interior was found a small coagulum of blood about the size of a duck-shot.

Dr Fisher considers these three cases as remarkable examples of the relation which exists between the cerebellum and the organs of reproduction, and is inclined to draw the conclusion, that the cerebellum is the "source and centre of this instinct."

Hypertrophy of the Heart, with Rupture of the Mitral Valves. (Dublin Journal of Medical Sciences, April 1839.) A boy, aged 15, was admitted into Meath Hospital, under the care of Dr Stokes, for a violent attack of pneumonia, affecting principally the left lung; the heart's action was exceedingly violent, and accompanied by intense bellows murmur; the symptoms were somewhat relieved by bleeding; but a fresh attack of inflammation supervened, in the course of which the patient was suddenly attacked with dreadful aggravation of dyspnœa and distress in the region of the heart, under which he rapidly sunk. He had long previously laboured under disease of the heart. On dissection, the mitral valve was found extensively ruptured, many of the tendinous cords broken across, and one of the valves lacerated through its whole extent; the valves appeared to have been for some time in a diseased state, being indurated and thickened.

Peculiar Distension of one of the Semilunar Valves of the Aorta, with Dissecting Aneurism of the Aorta, engaging the Ventricular Septum. (Dublin Journal of the Medical Sciences.) This extraordinary appearance was presented in the body of a woman who died from an attack of pulmonary apoplexy. The pericardium was adherent, and the left ventricle greatly thickened and enlarged; some firm cartilaginous tubercles were found in its substance. The aorta was extensively diseased, presenting earthy and atheromatous deposits in various states. The chief peculiarity, however, that one of the divisions of the aortic valves was dilated into a pouch, into which the finger could be passed for more than a quarter of an inch. The sac thus formed was exceedingly thin, and the valve was in-competent to close the orifice. Corresponding to one of the fibrous roots of the aorta, a small aneurism existed making its way downwards along the septum cordis, and taking a direction towards the right ventricle, into which, had the patient lived longer, it would in all probability have burst

Fracture of the Vertebræ with Laceration of the Spinal Cord. (Dublin Journal of the Medical Sciences.) A boy fell from a platform to the bottom of a limekiln, a height of twenty-five feet, and was taken up in a state of insensibility; he soon, however, recovered his consciousness, and it was then discovered, that from the sixth cervical vertebræ downwards he had *lost all sensibility, but not the power of motion.* He died 40 hours after the receipt of the injury. Fracture of the fifth cervical vertebræ was found on dissection; and a copious effusion of fluid, both external to and within the sheath of the spinal cord. The spinal màrrow, corresponding to the fracture, presented anteriorly a deep red colour, and highly congested appearance, and was much softened; *posteriorly it had suffered a complete laceration of its fibres.* The *ligamentum posticum* was not injured, neither was the sheath of the cord. Does not this case tend to throw some light on the physiology of the nerves of sensation and voluntary motion? It may in fact be regarded as an experiment performed on the human subject, proving the correctness of the views of Magendie and Sir C. Bell with regard to the anterior and posterior strands of the medullary cord.

On the Diagnosis of Delirium Tremens. (American Journal of the Medical Sciences, Nov. 1838.) Dr Samuel Jackson of Philadelphia has given an interesting practical paper on this disease, the results of an experience we should in vain look for in the practice of any single physician in this sober country. He remarks that physicians have constantly confounded two diseases under the name of delirium tremens; diseases perfectly distinct from each other, " not belonging to the same order, not even to the same class, one being, we conceive a pyrexia, and the other a neurosis." The first of these the author designates by the name of *mania à potu continuo,* the latter, by *mania à potu intermisso.* He remarks that the first of these being a pyrexia, is cured by antiphlogistic sedatives, the latter, being a neurosis, " by excessive stimulation, or by the sedation of narcotics in alarming doses." The latter of these diseases, or the " mania à potu intermisso," is the disease to which he thinks the term *delirium tremens* ought to be confined. It is not necessary that the accustomed dose of the stimulus be withdrawn; it is sufficient in very many cases to diminish it. It is thus that drunkards during a trifling illness are liable to attacks of this disease, as, in order to get rid of their indispoition, they diminish their daily dose. Sleeplessness comes on, soon increasing to the delirium so well known in this disease. It is in this state, and in this form of the disease, that sedatives in alarmingly large doses are the only remedies which can be relied on, and when the disease has attacked before, or the patient has been accustomed to very large potations of ardent spirits, the quantities required to be administered seem almost murderous; and if such large doses, both of opium and spirits are not given as will *produce an abatement of the delirium by forcing sleep,* the patient must die," and of course add another instance, however unjustly, to the number of cases fatally treated with opium."

The author's practice in this disease has been very great; for of two hundred patients treated by opium, brandy, and wine alone, he only lost four, and these were patients labouring under chronic diseases and organic lesions.

He remarks, that in genuine delirium tremens, the symptoms of fever, of inflammation, of turgescence of the brain, &c., require no leeches, no cupping, no antiphlogistics; all that is required to make " a safe, a quick, and pleasant cure," is to give opium in sufficient quantities.

With regard to the sufficient quantity, he states it to be impossible, in any particular case, to say *à priori* how large a quantity will require to be administered,—but it should be repeated in large and repeated doses, increasing the dose till sleep be produced. Unless this be produced it is certain the dose has been too small. Dr Jackson, as an example of what has sometimes to be done, tells us of about a "dozen standing cases" he had where the usual dose was from ten to twenty grains; and this last quantity he has in some of these administered in four hours. "In this way," says he, "we have almost uniformly put the patient into a salutary sleep, and a smaller dose, given at the moment he awaked, has almost completed the cure."

Dr Jackson gives the following summary of his opinions on this disease.

1. That delirium tremens is the consequence of a sudden abstraction or diminution of strong drink or opium in many persons who have long used either of these poisons intemperately.

2. That necrotomy has never discovered any lesions to which it could possibly be attributed; that it is purely nervous so far as human knowledge extends. As a stringed instrument is thrown out of tune by the atonic state of the atmosphere, so is the cerebral system in this disease, by the debilitating abstraction of stimulus.

3. That in all its degrees it is curable by opium, or by ardent spirits, or by a simultaneous use of both, though we shall sometimes fail by not being able to ascertain before it is too late, the requisite dose.

4. That it often supervenes on a system labouring under acute inflammation, the progress of which it will sooner or later suspend, so that opium may be given in the necessary doses. That though it arrests inflammatory action, it does not remove the effects thereof, which is the effect of time.

5. That suspending inflammatory action as it does, those authors who speak of pain in the head with fiery eyes requiring the loss of twenty to one hundred ounces of blood, have confounded the disease with temulent excitement.

6. That there are not two varieties of the disease, one to be cured by opium, and another by evacuation; one the consequence of too little, and the other of too much stimulus.

7. That evacuations, of whatever kind, have no tendency to cure this disease; they cure temulent delirium or its inflammatory consequences.

8. That mild cases have often been cured by various means, which fact has been the cause of many errors; that the worst cases are incurable without opium or spirits in enormous doses.

9. That there is a delirium frequently arising from drunkenness, which is often attended with convulsions, fits of drowsiness, flushed face, and inflamed eyes, with angry passions, noise, and turbulence; in a few cases with trembling; and in many, with two much watchfulness; which delirium is often postponed for a day or more after the patients have quitted their spirits, but it is radically the inflammatory state of the system thereby induced. This is often taken for *delirium tremens*, though it is easily distinguished therefrom, and requires a very different treatment. When this is subdued by the proper means, true delirium tremens sometimes supervenes.

MEDICAL PATHOLOGY AND THERAPEUTICS.

New mode of treating Apoplexy and Palsy. By ALEXANDER SOMERVAIL, M. D., of Essex County, Virginia. (American Journal of the Medical Sciences, February 1839.) Dr Somervail has very long practised amongst that class of men, whose full habits of body and excessive love for ardent spirits render them liable to be cut off by attacks of apoplexy or palsy. He found that when he treated these individuals according to the usually pursued mode, viz. by bleeding, blistering, &c. that nearly all died, and this event occurred frequently within a very few hours or days after the attack. The invariable bad success of this plan of treatment led him to doubt the propriety of depleting measures; and as he was induced to believe that, in habitual drunkards at least, the attack of apoplexy, after the stimulus of spirits had subsided, was chiefly owing to suspension of the nervous power, he resolved, therefore, to try the effects of emetics, and the tincture of the muriate of iron.

It does not appear, however, that he put this plan in operation till 1804, when he tried its efficacy on a lady of seventy, who fell down one day during dinner in a fit of apoplexy. An emetic of sulphate of copper was instantly administered, and the lady in no long time recovered.

The next case related is that of a man who, from an apoplectic stroke, "had lost the use of one side," to him in addition was given the tincture of the muriate of iron, ten drops every two hours. He recovered completely, and died eight years afterwards from fever, having had no return of palsy.

He relates more fully the case of a gentleman who was struck with palsy when twenty miles from home. After being brought home he was put to bed, and an emetic and then a cathartic administered, followed by the muriate of iron. He was able to walk within a week, and lived twenty years afterwards without any return of the disease.

He says he was forcibly struck with the impropriety of the depleting plan of cure, from reading the account of Sir Walter Scott's illness, everything corroborating his own theory.

He is of opinion that "apoplexy and palsy are not produced by increased arterial action, but, as far as the blood is concerned, it is retained in the veins from a diminution of nervous power."

Remarks.—Though the treatment of apoplectic and paralytic attacks by means of emetics and afterwards tonics be not new, yet we feel it our duty to observe, that nothing requires greater discrimination than this in the whole range of practical medicine. Many a person affected with slight sopor and some loss of power, has, upon the use of a full dose of an emetic, been plunged into complete apoplexy, or had a perfect attack of *hemiplegia*, and the occasional recoveries from sopor after the use of an emetic and the discharge from the stomach of a large quantity of undigestible and undigested food, is no proof of the general efficacy, or even the safety of the practice.

The appeal to the history of the case of Sir Walter Scott is singularly unfortunate; and had the author perused that history with attention from the first moment of attack to the last days of life, and compared with it the appearances disclosed by dissection, he never could have drawn the conclusion which he does in the paper now referred to.

What is the history of the illness of Sir Walter Scott except that of persons attacked by, and labouring under softening of the brain. First he has in 1829 an attack of acute pain, probably spasmodic of the stomach, which sends him screaming to bed. He is bled, and gets calomel and opium, the former in large doses. This is the usual character of gout in the stomach, and which is well known to be the precursor of an attack of apoplexy or palsy, if the benevolent warning to live soberly and temperately which it gives be not taken.

After this Sir Walter gives up in a great degree the use of wine; but he continues to take a little spirits and water occasionally as a sort of milder stimulus, which the system, he was led to believe, required, and which was safer. Next he falls down with loss of power, and the peculiar stunning sensation which takes place at the first onset of an attack of hemorrhagic injection of the brain, which, if not opposed, is to terminate in softening. He is then slightly hemiplegic, afterwards more completely so, and is recommended to go abroad for the probable improvement of his health. It is to be observed, however, that Sir Walter is allowed to continue his usual mode of living, while anxiety preys on his mind. He sails in the Barham, arrives in the Mediterranean, and visits various places in Italy without any amelioration in the symptoms of the disorder, but has an attack of apoplectic palsy at Nimeguen. He returns to England, and indeed in London the hemiplegia is so complete, that it is requisite to convey him to the Hotel, which is to be his temporary sojourn, like a motionless statue. The diseased action in the brain, it is to be observed, had never been stopped, and is still going on. Memory is impaired, almost extinct, speech gone, voluntary motion gone, and, in short, Sir Walter is exactly in the state so correctly described by himself as occurring in the person of his own father. At the same time softening of the left *corpus striatum* is proceeding, and the same change affecting the contiguous parts of the brain. The sequel of the story is well known. He is conveyed to Edinburgh, and thence to Abbotsford, where the last scene speedily terminates the life of this remarkable man. Upon inspecting the brain, considerable softening is found in the part specified, viz. the left *corpus striatum,* and extending into the hemispheres.

It would be absurd to say that this state of the brain had taken place recently, or, in short, to attempt to maintain that it had not commenced at the time when the first fall in Castle Street took place, and had not been slowly but steadily going,on from that time to the period of death. No one who knows any thing of morbid anatomy or pathology will deny, that the softening was the effect of inflammatory or hemorrhagic injection or both; and if any does deny this, it is of no use reasoning with him, for it is quite clear that he has yet several important and essential portions of professional information to acquire.

Dr Somervail, and all those who entertain similar opinions, would do well to peruse the account of the illness of the late Dr Adam Fergusson, Professor of Moral Philosophy in the University of Edinburgh, as given by Dr Black in the seventh volume of the Medico-Chirurgical Transactions, p. 228, and contrast the beneficial effects of the method of management there pursued with that recommended by Dr Somervail.

Albumen a cure for Dysentery. (Archives Generales, April 1839.) Theory first led Dr Mondière to think of employing albumen in dysentery. Because the blood in chlorosis is deficient in ferruginous ingredients, and is cured by the administration of preparations of iron, he thought that dysentery might in like manner be cured, by furnishing to the blood the albuminous principles which are thrown off in such large quantities in this disease. The first case in which he tried this remedy he was eminently successful. The patient had been under treatment for dysentery for several days without being benefited, but in a few days after he commenced the use of albumen, he was restored to health. Shortly after this, dysentery prevailing as an epidemic, gave Dr Mondiére ample opportunies of establishing the curative powers of albumen, many cases, he assures us, yielding within from twelve to twenty-four hours after the commencement of the albuminous treatment. The formula in which he administers this remedy is the following. Take two pounds of water, and six whites of egg, and beat them well together, then strain, and add three ounces of sugar, as much orange flower water as will flavour it. Three or four bottles of this mixture must be administered in the course of the twenty-four hours; and the same is also given in injections.

Bicarbonate of Soda in large doses a cure for Croup.—(Gazette Medicale de Paris, April 13, 1839.)—A child, after playing for some time in a damp court, was suddenly seized with extreme difficulty of breathing, and so loud as to be heard in the next room, with a hoarse suppressed cough, coming on in fits; the voice almost gone, and the inspirations very noisy. The face was swollen, as also the neck, to which part the child frequently raised its hands as if to tear away something. The expectoration was tough and glairy, and mixed with some cream-coloured particles. At each fit the child started from its bed in great terror. The pulse was 160; and during the remissions the tracheal rattle was so loud as to conceal the natural sounds of respiration; and no doubt existed of its being a genuine case of croup. In these circumstances two scruples of the bicarbonate of soda were ordered to be dissolved in four ounces of milk and water, with the addition of one ounce of syrup of mulberries, and of this a tea-spoonful was given every five minutes; sinapisms were applied to the limbs, and purgative enemata administered every hour.

At the end of two hours, shreds of membrane were expelled with the expectoration, but the patient was otherwise much as before.

Three hours after, the child was much better; it had coughed up many shreds of false membrane; the anxiety was less; the cough had diminished in intensity and frequency, and the pulse had fallen to 120 beats; the laryngeal rattle, however, still continued.

Next morning the child was in a very satisfactory state, and had passed a good night. The cough had ceased to come on in fits, but the voice was still somewhat croupy: the pulse had fallen to 100; the swelling of the neck was gone. The laryngeal rattle was nearly gone, and by next day the child was so well as to be able to run about. About three scruples in all of the bicarbonate had been administered during the disease, and it is mentioned as an additional recommendation, that the child had never desired to take any other drink than that presented during the intensity of the disease.

A living Batrachian Reptile passed per anum after a residence of four years in the digestive organs.—(Gazette Medicale de Paris, 27th April 1839.)—Dr Luroth met with anomalous and very obscure symptoms in a woman of about 30 years of age, for the relief of whose complaints every means were tried without avail. At last, four years after first complaining of these symptoms, she felt a pressing desire to evacuate the bowels, and retired for this purpose to her father's garden, where she was sensible that she passed a pretty solid and voluminous body alongst with the purulent matter. On examining what this body was, she found it to be "an animal in the form of a lizard, of the length and thickness of the index-finger, provided with a head, four short distant feet, and with a rounded tail, terminating in a soft point. The back of the animal was blackish and marked with reddish spots; and the belly had the yellow colour of a ripe quince."

It may be mentioned that, after passing this animal, all her symptoms diasppeared, and she soon recovered her health and strength.

Dr Luroth is of opinion that this was a *Salamandra maculosa*, or the common land salamander, which the girl had swallowed, whilst it was in the state of ova or spawn; and he has no doubt that it is possible the animal may have lived for the time stated in the stomach or intestines of the individual.

We confess we are incredulous as to the fact altogether. Because, in the first place, we have only the girl's word for it, that such an animal was passed; secondly, the place where it was said to be passed is suspicious,—a garden, and under a tree, the very place where these animals are usually found; and lastly, what we think bears out our supposition more strongly than the others, that the animal was of precisely the same *dark* colour as those found in their native habitats, which it could not have been, had it been excluded from the light for such a lengthened period.

OBSTETRICS.

Abortion of one twin, the other remaining.—By Samuel Jackson, M. D. Philadelphia, (American Journal of the Medical Sciences, May 1838.)—A lady suffered abortion at the end of the third month, attended with considerable hemorrhage; but after recovering from the effects of this, she was surprised to find herself still affected with the morning sickness, and other symptoms which usually attend pregnancy. Dr Jackson being consulted in this case, arrived at the conclusion, that she had been pregnant with twins, had parted with one, and that the other was the cause of her present symptoms; which turned out to be the case, because at the regular period she was delivered of a healthy child.

Dr Jackson mentions that a similar case occurred in the practice of his friend Dr Nancrede, where a fœtus of four and a-half or five months old, had been aborted, and yet the woman was delivered of a full-grown healthy child about four months afterwards.

ETIOLOGY, STATISTICS, AND LEGAL MEDICINE.

Influence of civilization in the production of Insanity.—By A. BRIERRE DE BOISMONT.—(Annales d'Hygiene Publique, April 1839.)—M. Brierre has given a full and interesting account of the influence which civilization has in the production of mental derangement. He first remarks that, in lunatic asylums, the number of cases of insanity brought on by moral causes greatly exceeds that produced by physical causes; and tracing this through all the different countries of Europe, America, and Asia, with regard to whose history, we have anything like accurate details, he demonstrates very clearly, that, just in proportion as a people are higher advanced in civilization, in the same proportion, very nearly, is the number of cases of mental derangement increased. He likewise traces the marked influence which any unusual public excitement, more particularly religious excitement, has had in increasing the number of cases of insanity; and he has noted in his paper the most remarkable of these from the days of the ancient Greeks and Romans down to modern times. He also takes occasion to remark that all the exciting periods of history have been constantly followed by an increase in the number of the insane, and instances in proof of this, the revolutions of France, and the various exciting periods in the history of Great Britain and of Germany. He casually takes notice of the influence of fear as a cause of insanity, remarking that, during the prevalence of the epidemic cholera, the number of cases of insanity admitted into the Hospitals of Salpetrière and Bicetre were increased by a sixteenth more than they were on previous or subsequent years.

All the causes act more powerfully on the inhabitants of the town than on those of the country, which is to be attributed to the passions being more energetic and more frequently excited than they are among a rural population. He also notices a remarkable fact, yet one which is explicable on the same principles, that mental derangement is less frequent amongst Roman Catholics than amongst Protestants, and this because the first have their consciences quieted at once by confession, penance, &c., whilst the Protestant's mind is left harassed by doubts and anxieties, highly favourable to mental derangement.

M. Brierre then goes over in detail the different nations of the world, comparing the number of the insane to the population, and showing that, just in proportion as these nations rise in the scale of civilization, the proportion of insane to the number of the population increases. We cannot enter at large upon the subject at present, but shall content ourselves with giving the general results in a tabular form.

Capitals.	Population.	No. of Insane.	Proportion.
1. London,	1,400,000	7000	1 in 200
2. Paris,	890,000	4000	1 in 222
3. St Petersburgh,	377,046	120	1 in 3133
4. Naples,	364,000	479	1 in 760
5. Cairo,	330,000	14	1 in 30,714
6. Madrid,	201,000	60	1 in 3350
7. Rome,	154,000	320	1 in 481
8. Milan,	150,000	618	1 in 242
9. Turin,	114,000	331	1 in 344
10. Florence,	80,000	236	1 in 338
11. Dresden,	70,000	150	1 in 466

If these towns were to be arranged in the order of the proportion of insane to their population, their order would stand thus:—1. London, 2. Paris, 3. Milan, 4. Florence, 5. Turin, 6. Dresden, 7. Rome, 8. Naples, 9. St Petersburgh, 10. Madrid, 11. Cairo. The conclusion to be drawn from this table is, that insanity follows an arithmetical proportion based on the activity, the intelligence, the energy of the passions, and the degree of liberty of each capital.

The same conclusion is arrived at if we compare the total numbers of the insane to the whole population of the country, as the following table will show:—

Countries.	Population.	No. of Insane.	Proportion.
State of New York, .	1,617,458	2,240	1 in 721
England, . .	12,700,000	16,222	1 in 783
Scotland, . . .	2,093,454	3,652	1 in 563
Norway, . .	1,051,318	1,909	1 in 551
France, . .	32,000,000	32,000	1 in 1000
Provinces of the Rhine,	2,067,104	2,105	1 in 1000
Belgium, . .	3,816,000	3,763	1 in 1014
Holland, . .	2,302,000	2,300	1 in 1046
Italy, (not including Sardinia, Corsica, or Sicily,) .	16,789,000	3,441	1 in 4879
Spain, . .	4,086,366	5,669	1 in 7181

From the facts stated, the author draws the following conclusions:—

1. Insanity is more frequent, and its forms more various, as the people are more civilized; whilst it is of less frequent occurrence as the people are more ignorant.

2. Amongst the first class, insanity is chiefly attributable to moral causes, amongst the latter class, to physical causes.

3. This distinction is equally applicable to civilized nations; the better informed classes are more frequently rendered insane from moral causes; the more ignorant from physical.

4. Each age and country has been witness to the developement of insanity from the influence of some predominant idea, which in a manner marks the epoch.

5. Every remarkable event, every great public calamity, augments the number of the insane.

6. The proportion of the insane to the population is greater as the nation is more civilized. The number of the population has no immediate influence on the developement of the malady, seeing some large capitals and very populous nations contain a small proportion of insane.

7. The increase of the number of the insane increases in proportion to the developement of the intellectual powers, the passions, the industry, the riches, or the misery of the people.

8. Insanity being intimately connected with civilization, and caused in great measure by moral causes, the moral means, and chiefly the wise direction of the passions, ought to form the essential and principal basis of the treatment; above all during convalescence, its influence will be much more powerful if the insane has been well educated, and from the higher classes of society. But as the employment of these means demands an active surveillance, and can only be put in operation by one man, it is evident that but a few individuals at once can derive advantage from this. It would be impossible to pursue this treatment, but in well kept and small establishments. And we are convinced that the proportion of cures would greatly increase if each department or district would increase the number of their asylums, and not collect, as at present, five or six hundred insane under one roof.

Case of Sudden Death, alleged to be from Poisoning by Kreosote. (*Liverpool Mercury*, 15th June 1839.) An accident terminating fatally, lately occurred at Bangor, shortly after a draught, supposed to contain kreosote, was taken. The sufferer was Mrs Mary Donbavand, an unmarried lady, in her sixty-seventh year, of independent circumstances. On the afternoon of Monday seven-night, Dr Roberts called upon her, and recommended her to have her usual draught ready, but not to take it unless she was compelled to do so by the pain. At four o'clock next morning, he was called to his patient, and on entering her apartment, she exclaimed,' 'My God, I am poisoned! That man has not sent the draught prescribed by you. I have felt all on fire since I took it." The unfortunate lady complained of agonizing pain. Every possible attempt was made to relieve her, but in vain; and she lingered in great torment until the following Wednesday morning, about four o'clock, when death released her from her sufferings.

It appears that on Monday evening, (10th June), after the departure of the medical attendant, the prescription was sent to the druggist who had been in the habit of preparing a similar draught for the deceased some time before. Unfortunately he took, in preparing the draught, the wrong phial, and mixed the other ingredients with two drachms of kreosote instead of two drachms of spirit of camphor; and so strong was the draught containing that energetic medicine, that the hand of one of the female friends of the deceased is reported to have been blistered by merely coming in contact with it.

Supplementary Tables to Dr F. Tiedemann's *Great Work on the Arteries of the Human Body, consisting of eighteen coloured lithographic drawings, copied from nature, and of the full size; with an explanatory text in both Latin and German.*—Professor Tiedemann, in reference to these tables, remarks, that since the publication of his plates of the arteries sixteen years ago, he has continued uninterruptedly to direct his attention to the course and manner of distribution of the arterial system in all the subjects which have been dissected in his anatomical school at Heidelberg. In addition to this, he has carefully inspected, in the principal anatomical museums in Europe, such specimens of remarkable varieties in the distribution of the arteries as are there preserved, and has obtained from these sources careful and accurate delineations of many irregularities in the arteries, which have not been represented in his previous work. The proposed supplement will contain, *first*, a series of plates illustrative of those more rare varieties in the course of the arteries which, during surgical operations, are occasionally met with, and require to be well known; and, *secondly*, will exhibit some accurate representations of the situation and course of those anastomosing vessels which, in ordinary circumstances, carry on freely the circulation in several parts of the body, and which again, upon the obliteration of the larger arterial trunks being caused by the application of the ligature or otherwise, still maintain the free current of the circulation. The Professor hopes, in this way, to contribute largely towards the advancement of our anatomical knowledge of the arrangement and course of the arteries; but especially he expects to render a real and essential service to the practical surgeon. The greatest care and diligence are to be bestowed upon the execution of this work, as regard the drawings and letter-press. The form and general style of the supplement will correspond with Professor Tiedemann's large work on the arteries, already so favourably known to the profession.

The farther execution of this work will be proceeded with so soon as the names of subscribers for it shall be procured in sufficient number to cover the necessary expenses. Teachers of anatomy, surgeons, and physicians, who purpose to become subscribers, will therefore observe, that as the number of impressions of these supplementary plates will be small, it becomes necessary for them to make application for copies without delay.

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PART I.

ORIGINAL COMMUNICATIONS.

ART. I.—*An Experimental Inquiry into the Physiological Action of Ergot of Rye.* By SAMUEL WRIGHT, B. A., F. B. S. E., M. S. A., Senior President of the Royal Medical, Royal Physical, and Hunterian Societies of Edinburgh, Honorary Member of the Metaphysical Association of Glasgow, and of the Physiological Society of Montpellier. (Being an abridgement of the Harveian Prize Essay for the Session 1837—38.)

WHETHER ergotted grain were known to the ancients is a matter of doubt. It is said to have been mentioned by Theophrastus, Virgil, Ovid, and Pliny ;[*] but I think it very probable that they were not acquainted with any other forms of the disease than smut and mildew. The " luxuries segetum" of Theophrastus and Pliny has been supposed to imply ergot, though the evidence in its favour I have never been able clearly to ascertain. We are, however, certain that it has been extensively known during the last two centuries, described as chiefly affecting rye, and recognized by various names, according to the languages in which it may have been expressed.

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[*] Spicæ quædam binos ordines habent, quædam plures usque ad senos. Grano ipsi aliquot differentiæ, longius, leviusque, aut brevius, aut rotundius, candidius, nigrius, vel cui *purpura* est.—Plinii, Nat. Hist. lib. 18, c. 18.

Germ. Mutterkorn, Afterkorn, Schwarzkorn, Halmensporn, Aetzroggen, &c.—*Fr.* Seigle ergoté, Bled cornu, Clou de seigle, Mère de seigle, Bled avorté, Bled farouche, Have, or Rachitique, Calcar, Chambucle, Ebrun, Faux seigle, Seigle cornu, or corrumpu, Seigle à eperon, or ergotisé, Seigle ivré, Seigle noir, Argot, &c.—*Ital.* Grano allogliato, Segala allogliata.—*Polon.* Paniec. *Russ.* Spornick.—*Angl.* Ergot, Ergotted, Horned, or Spurred Rye.[*]—*Lat.* Clavus secalinus, Secalis mater, Ergota, &c. "A Cl. Candolle, qui illud inter fungos computat, vocatur Sclerotium clavus; eandem ob causam a Doct. Münchhausen, Clavaria solida. Doct. Robert, ob vires partum promoventes, illud nuncupat Secale Puerperale, vel Melanophyma secalinum; (nigra in Secali semina.")

Ergot is a disease to which rye is more liable than any other grain, though Tillet observed it in wheat near Rheims;[†] and the author of the Journal Encyclopédique says that he has repeatedly seen the oat so deteriorated.[‡] Nor is it uncommon for barley to become ergotted in Scotland.

This disease has also been noticed in the

Phalaris canariensis
——— aquatica
Panicum miliaceum
Phleum pratense
Poa fluitans
Festuca duriuscula
Alopecurus pratensis
——— geniculatus
Aira cristata
Agrostis stolonifera

Arundo arenaria
——— cinnoides
Elymus arenarius
——— Europæus
Triticum spelta
——— junceum
——— repens
Holcus avenaceus
——— lanatus
Dactylis glomerata[§]

By Curtis in the *Festuca fluitans*, and by others in the *Avena elatior*,[‖] and in the family of palms.[¶].

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[*] From its supposed resemblance to the spur of a cock or a horn.

"Deep-rooted mould, and Ergot's *horn* uncouth."—
(Darwin's Bot. Garden, Canto 4.)

"Denominationis origo facili negotio explicatur: secale enim appellatur, quod vulgo observatur in secali cereali; *cornutum*, figura, quod semina hoc vitio degenerata ad calcaris vel cornu similitudinem accedunt; quoad significationem ergo nihil differunt nomina: secale corniculatum, calcaratum, frumentum, cornutum, et alia, quæ passim reperimus."—(Rudolph Padiera, Med. Diss. De Secali Cornuto, Cap. i.)

[†] Dissertation sur la cause qui corrompt et noircit les grains du blé dans les epis, et sur les moyens de prévenir les accidens.—Bordeaux, 1755, 4to.

[‡] Journ. Encyclop. Juin 1771. p. 209.

[§] Rust's Magazin für die gesammte Heilkunde, 25, 8.

[‖] Lond. Med. and Phys. Journ. 1817, Vol. xxxviii. p. 334.

[¶] Aymen.—It may be observed, that Tissot states, on the authority of Haller, that the ergot affects only rye, and two or three other alpine plants of the grass kind.—(See Philosophical Transactions for 1765, Vol. lv. p. 110.)

SECTION I.—*Physical Characters of Ergot of Rye.*

Ergot, when ripe, displays itself in the form of a dark-coloured substance,[*] which, in the place of sound grain, resides in the glume, exceeding it variously in length, and, if abundant, rendering the ear very conspicuous from the peculiarity of its hue. Some of the grains are composed of sound and diseased portions; the ergotted part, varying from one-third to one-half, is always within the husk.[†] It is rare to find all the pickles of an ear ergotted, the fewer so corrupted the more luxuriant they are. And conversely, when numerous, they are small in size, sometimes not exceeding the diameter or length of a sound grain.[‡] The number of ergots in each ear is usually from four to five, though sometimes there will be ten or twelve. If only two or three be present, the sound grains upon the same ear are observed to be larger than usual; the whole plant is also more vigorous and healthy. But when the ergots are numerous, the grains not actually diseased have a very unhealthy appearance; they look shrunken, and are covered at their superior extremity with a black powder.[§]

It is chiefly produced upon low lands, more frequently on the borders than in the middle of a field, and generally in hot summers when there is plenty of rain. Spring wheat is also more liable to it than that sown in the winter season.[||]

Ergot of rye is triangular in form, occasionally round, but oftener angulated, retaining the original longitudinal depression of the sound grain, to which are generally added two or three others, running from one extremity to the opposite. Its length is from six to ten lines; though often much greater. I have seen it eighteen lines in extent; and Aymen says that he has preserved in his herbarium a specimen, the length of which is equal to twenty-six lines. It is from one to three lines in diameter, generally smooth, of a violet-brown or brownish-purple colour, and curved towards the extremities, which are commonly tapering. To the naked eye its surface appears uniform, but when viewed through a microscope it is found to be sprinkled over with sparkling white dots, translucent and angular. Sometimes it is entirely covered with a grayish mealy powder, arising from the puncture of an insect, which transfers some portion of the substance of the grain to the surface.

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[*] Tissot says that it is sometimes green.—(Traité des Nerfs, et de leurs Maladies, Vol. vi. p. 218.)—When growing it is usually of a deep-green colour, gradually changes to a light pink, and when matured becomes purple, from the action of atmospheric air upon its oil.

[†] Dissertation by Oliver Prescott, A. M. Read before the Massachuset's Med. Soc. June 2, 1813.

[‡] This is only the case with rye. Ergot of wheat, whether sparing or abundant, is always found to be short and thick.

[§] Tessier, Traité des Maladies des Grains. 8vo, Paris, 1783, p. 421.

[||] We hence see the appropriateness of Virgil's allusion.

> "Multi ante occasum Maiæ cæpere: sed illos
> Expectata seges vanis elusit aristis."—Georg. lib. i. 225–6.

Columella also remarks—It was an old proverb amongst farmers, that an early sowing often deceives our expectations, but seldom a late one.

The growth of ergot is very rapid when compared with that of the sound grain. Philippart in his "Traité Organographique et Physiologico-agricole sur l'Ergot, &c. dans le Cereal," says that he observed some particular plants of rye whilst passing a certain corn-field, which plants had no appearance of ergot, but in ten or twelve days afterwards they had full-sized ergots on them.

It is firm, hard, and fragile when dry; soft, flexible, and tough when moist; emitting in the former instance, a heavy mawkish smell, in the latter, the odour of mouldiness.

It breaks with a clear transverse fracture, and the newly separated parts have a bright almond-like structure, over which is shed a faint blush of pink. When split longitudinally, little scales or lamellæ are often found, covering oblong cavities, each cavity usually terminating in a *cul de sac*, being rarely continued to the surface. These little canals are branched, and filled with a grayish dust, interspersed with a number of shining granules.

Ergot of rye has a nauseous acrid taste, leaving in the mouth a slight, but disagreeable sensation of warmth.* When kept in a moist atmosphere, it becomes soft, enlarges slightly, and is extensively preyed upon by insects; the outer covering acquires an intense blackness, and the active property of the drug is gradually impaired and lost. It is said that after having been twice subjected to dampness and dried again, it is no longer punctured by insects, but remains permanently enlarged. If reduced to powder before exposure to moist air, it very readily grows damp, and spoils much sooner than when exposed in the whole state, being in a few days completely covered with animalculæ. Roll sulphur has been suggested as a preservative; but I have never been able to discover the least advantage in its employment. Camphor has also been advised, and with much more propriety, for if intermixed with even powdered ergot, it completely prevents the formation of animalculæ; but the particles become moist, semi-pellucid, and mouldy, the activity of the substance at the same time diminishing. It is, however, best preserved in a warm dry place, after having been wrapped in absorbent paper, and secured in a well-stoppered bottle.

As it is important to distinguish between a good and a bad specimen, it may be observed, that if the ergot be clear and smooth upon the surface, not powdery, of a deep purple colour—neither totally black nor light brown, having a full strong odour, breaking clearly,† exhibiting a pink blush interiorly, unpunctured by insects, burning with a clear jetting flame, and being of less specific gravity than water, its activity may be trusted.*

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* Zimmermann, von der Erfahrung, Th. 2, p. 242, and Trommsdorff, Neues Journal der Pharmacie, Bd. 2, St. 1, p. 94, deny that it has any taste.

† It is necessary that the sample should be broken, and perhaps, that it should be tested, for Dr O'Shaughnessy once analysed a specimen of alleged ergot, which

SECTION II.—*Chemical Characteristics and Composition of Ergot of Rye.*

When moderately heated, ergot becomes light-coloured, loses its natural smell, and acquires the odour of roasted wheat, at the same time greatly diminishing in activity. Flour, which contains as much as one-third of ergot, rises without any difficulty when made into paste, though when baked, the bread is dry and brittle. When ergot alone is made into bread, it does not ferment, remains sad, or heavy, and crumbles when handled.†

When ergot is boiled in water, it forms, if the preparation be concentrated, a deep claret-coloured solution, having the odour of ergot, and embodying its active principle. Continued boiling weakens the medicinal activity of the solution, and will, if sufficiently continued, render it inert. The cuticle does not peel off by maceration, nor can boiling, however protracted, separate it; but its colour is transferred to the interior of the grain, giving it a deep-red tinge. The solution obtained by boiling exhibits a white pellicle upon its surface, when cool, which is the oil of ergot altered by heat and moisture, and in this condition looks like common fatty matter.

An infusion of ergot is thus affected by reagents. Litmus paper indicates the presence of a free acid. Caustic potassa renders it a fawn colour in a few minutes; flakiness succeeds, which terminates in a light brown precipitate.‡ Caustic ammonia gives a bulky precipitate of a light pink colour. Lime-water, a light blue deposit. Carbonates of soda and potassa, no immediate effect, but in a few minutes there is a deposition of a grayish-pink colour. The strong acids afford a yellowish flaky coagulum. Io-

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proved to be nothing more than plaster of Paris artfully coloured. (Lancet, 1830–31. Vol. i. p. 638.) And I have several times observed the ergot to be adulterated with common paste; a fraud, I suspect, of very frequent occurrence, though not of very easy detection; for the process of baking generally modifies the starch, so that it can scarcely be indicated by iodine. The best way of testing it is to powder the suspected sample, and, after moistening with water, to triturate it gently with iodine, when, if a blue colour results, an impurity may be credited. If this process be not satisfactory, the specimen may be digested in ether; if the ergot be genuine, a yellowish oily solution will result; if impure, little change will take place.

* The lightness of ergot depends upon the presence of its oil, which reduces its weight considerably below that of sound rye: hence the ergotted ears stand upright, those, on the contrary, not diseased, bend down from their greater weight. A measure that holds fourteen pounds of rye, holds only nine pounds of ergot.

† I may here state, that in giving ergotted bread to dogs, they have invariably been less affected by it, than when a similar quantity of ergot has been administered in an uncombined state.

‡ The action of caustic potassa upon an aqueous solution of ergot, prepared without heat, is somewhat different. When first added, it gives the liquid a greenish tinge, and a curdy precipitate falls. If an acid be then dropped in, the precipitate is redissolved, and the original colour restored.

dine darkens its colour merely. Iodide of potassium, no change. Persulphate of iron, no change. Nitrate and acetate of lead form a bulky precipitate of a dirty violet colour, which is slow in falling. Protochloride of tin gives an abundant precipitate of a light-yellow colour. Chloride of gold, a yellowish deposit. Infusion of galls, a brown coagulum, which dissolves on being agitated. Alcohol occasions a slight opacity. Sulphuric ether when agitated with it forms a solution, which, on standing, separates into three strata,—the lowest, consisting of the aqueous solution, the middle one, of oil dissolved in ether, and the upper one, of pure ether.

Alkalized water, when boiled upon ergot, forms a saponaceous solution, in which the greater part of the colouring matter prevails. Alcohol removes the active principle of ergot, with a very small portion of its colouring matter. Ethers, sulphuret of carbon, naphtha, and the essential oils also separate its active principle, but leave the pigment untouched. Water, therefore, pure or alkalized, is the best solvent of the colouring matter.

This colouring matter is capable of being fixed as a dye; for, if wool or silk, prepared by digestion in sulphate of alumina, be dipped into a solution of ergot, it becomes beautifully tinged with a hue, varying from a light pink to a deep violet.[*]

Chemical Composition.—Ergot of rye has been analysed by Vauquelin,[†] Bonvoisin,[‡] Pettenkofer,[§] Winkler,[‖] Keyl,[¶] Robert,[**] and others.

Vauquelin obtained a pale yellow pigment, soluble in alcohol; a white oil of a sweetish taste; a violet-coloured pigment, insoluble in alcohol; an acid, resembling the phosphoric; and a vegeto-animal matter, which easily putrefied, and afforded a thick oil and ammonia by distillation.

Pettenkofer, in addition to these constituents, obtained a reddish-yellow resin, phosphates, and a little acetic acid.

Winkler found gum, osmazome, salts of soda and ammonia, a modified fecula, in union with colouring matter, a thick, rancid, slightly acrid oil, and a thick reddish fluid, which had a highly disagreeable empyreumatic odour, a nauseous, sweetish, and slightly acrid taste—composed chiefly of resin, extractive, and colouring matter.

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[*] Vauquelin, Annales de Chimie et de Physique, Tom. iii. p. 337.

[†] Buchner's Repertor. für die d. Pharmacie, Th. 3, and Bulletins de la Soc. Philomatique, 1817, 58.

[‡] Geblen's Journ. d. Chimie, Th. 6. 1806.

[§] Buchner's Repert. 3. 65.

[‖] Rust's Magazin. Bd. 25. Hft. 1, p. 47–49.

[¶] De Secali Cornuto, etc. Diss. Ber. 1823.

[**] Rust's Magazin, Bd. 25, Hft. 1, p. 41, sqq.

Keyl obtained similar results, but was unable to find either hydrocyanic acid or morphia, both of which were said to be present.

Bonvoisin concluded from his experiments, that the constitution of ergot is highly favourable to decomposition; and further imagined, that, by its putrescency, it acted upon the animal body, occasioning a dissolution of its several parts.

Robert inferred from his researches, that the acid which Vauquelin had supposed to be phosphoric, was none other than hydrocyanic, for the liquor obtained by the distillation of ergot readily killed insects, and gave out a strong narcotic odour, which occasioned dizziness. He also imagined that it contained some specific poison, hardly to be detected by chemical means.

Winkler obtained an acid, the certain nature of which he was unable to prove, but he denied the presence of hydrocyanic acid. He also found amylum, osmazome, saline matter, and chlorophylle; a thick oil, similar to what he had obtained from *Artemisia vulgaris*, and a pigment, analogous to that in the lichen, *Roccella tinctoria.*

According to the researches of Maas, a German chemist, ergot contains no amylum, but consists for the most part of gluten, a colouring matter, resin, fixed oil, and an alkaline principle, apparently combined with acetic acid. The alkali he believes to be either ammonia or a peculiar alkaloid. He says he could never find a trace of hydrocyanic or phosphoric acid, morphia, or narcotine.*

The most elaborate analysis yet given is by Wiggers,† whose results are as follow;—

A thick white oil,	35,0006
White fatty matter,	1,0456
Cerine,	0,7578
Fungin,	46,1862
Ergotine,	1,2466
Osmazome,	7,7645
Sugar,	1,5530
Gum extractive and colouring matter,	2,3250
Vegetable albumen,	1,4600
Phosphoric acid and phosphate of potass,	4,4221
Phosphate of lime and traces of iron,	0,2922
Silica,	0,1394

I have read attentively the analysis of Wiggers, which is detailed in the "Journal De Pharmacie," but I must confess that I think many of his supposed constituents are products, and not educts. This appears to me especially the case in reference to the cerine and sugar, both of which were probably formed by the solutions of ergot standing for some time. When we consider the liability of vegetable solutions to alter by exposure, and the facility with which new substances are produced, we may easily imagine that some of these constituents were formed during the analytical process; and were not originally present in the ergot. The vegetable albumen I have never been able to discover by any of the means usually employed for its detection, and if the analysis of Wiggers be accurate, my own must either be imperfect, or the specimens of ergot which I examined were peculiarly simple in composition. The following is the analytical process which I have adopted.

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* Quoted in the Lancet, 1829–30, Vol. ii. p. 187.

† Journal de Pharmacie, Tom. xviii. 525.

To determine the nature of the free acid, the character of which was suspected by Vauquelin, and erroneously represented by Mr Battley,* I prepared a strong infusion of ergot—200 grains to two ounces of water, and submitted it to slow distillation until two-thirds had passed over. The distilled liquid showed no traces whatever of acidity, but the residual portion was more strongly acid than before concentration. Being satisfied from the fixedness of the acid, that it was neither hydrochloric nor hydrocyanic, I proceeded to demonstrate its nature by filtering through charcoal to remove the colouring matter, and then dividing it into two equal parts. To one of them was added a solution of nitrate of silver, when immediately a yellow precipitate fell, which, when moistened with sulphuric acid, and subjected on charcoal to the flame of a blowpipe, tinged it green. The other portion was acidified with strong acetic acid, and acetate of baryta subsequently added.† The solution was then filtered, slowly evaporated to one-half, and exactly neutralized with ammonia.‡ On adding acetate of lead, a copious precipitate was obtained. The precipitate on being fused on the outer flame of the blowpipe, was in distinct crystals on cooling. Another portion, after having had a drop of sulphuric acid added to it, on being exposed to the inner flame on charcoal, tinged it green.

These experiments, which were many times repeated, and with the same results, appear to justify the inference that the free acid contained in ergot of rye is phosphoric acid. The further analysis of ergot I prosecuted in the following manner.

Any proposed quantity of it is to be reduced to a very fine powder, and acted upon by sulphuric ether in successive additions, until nothing more that is soluble in that menstruum is taken up.[*] Each of the ethereal solutions, after separation and evaporation, furnishes a determinate quantity of oily matter, and the whole collectively weighed, give the proportion of that constituent to the ergot used.

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* London Med. Gazette, 1830–31, Vol. vii. p. 681.

† The object here, was to remove any traces of sulphuric acid, and the acetic acid was added to prevent the phosphate of baryta subsiding along with the sulphate; the latter readily precipitating from an acid solution, the former only from a neutral one.

‡ The fluid was concentrated with the intention of removing as much of the acetic acid as possible; for acetate of ammonia is capable of retaining phosphate of baryta in solution.

The residuary grain is then to be carefully dried, so that all the remaining ether may be expelled, or the next solution will include the colouring matter. When thoroughly dry, it is to be treated with distilled water, until everything soluble in that liquid is removed. The solution thus obtained comprises the mucilage and osmazome.[†] By evaporating to dryness, and acting upon the residue with strong alcohol, the osmazome is separated and the gum left. The latter is then to be weighed, and its quantity noted, and after evaporating the alcoholic solution to dryness, the proportion of osmazome is similarly defined.

The grain is next to be boiled in two or three successive measures of strong alcohol, and each filtered whilst hot. The solutions, after intermixture and evaporation, give the gluten contained.

The residue is now to be boiled in dilute nitric or hydrochloric acid to dissolve the fungin. This, after the liquid shall have been filtered, may be precipitated in a gelatinous form by the addition of tincture of galls, or an alkali.

The colouring matter next requires to be removed, and its separation is a work equally protracted and difficult. The remaining solid matter of the grain must be boiled in successive portions of *liq. potassæ*, until the whole of the colouring material is extracted. But the potash takes up also the fecula,* which needs a subsequent removal. For this purpose, the potash solutions are to be neutralized with an acid, evaporated to dryness, and acted upon by *liq. ammoniæ*, which has the property of removing the colouring matter in this state, though before it would be unaffected by it. The ammoniacal liquid after evaporation leaves a definable proportion of colouring material.

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[*] It is necessary that the ether be very pure, and that no water be present, or a complex solution will be formed.

The resin spoken of by many, I have never been able to detect; and as this substance is soluble in ether, it should if present, be furnished along with the oil which is taken up by that solvent. None, however, is afforded in this process, or in any of the succeeding ones, and I am disposed to believe that the alleged resin is nothing more than inspissated oil; for a specimen of ergot which I examined after it had been for some time exposed to atmospheric air and warmth, displayed traces of resinous matter, although a sample from the same packet, examined prior to its exposure, gave no such indications.

The fatty matter, cerine ? &c. I have never been able to find. They are probably nothing more than oil, modified by warmth and moisture.

[†] It is remarkable that this substance, which is so essential a constituent of muscle, should be found prevalent in vegetable matter. But ergot is not the only one of the vegetable tribes which contains it. It is found in the *Agaricus campestris* and *Agaricus pseudo-aurantiacus*; in the rhizome of ginger. (Morin, Journ. Pharm. 10, 252, 9, 258.); in dyer's broom, (Cadet Gassicourt, Journ. Pharm. 10, 434); and in the matter secreted by the bracteas of the female hop; (Payen et Chevallier, Journ. Chim. Med. ii. 577). I have continued the old term osmazome, though I am aware that such a substance is not recognized by modern chemists; inasmuch as late experiments in organic analysis have resolved it into various primitive constituents. But as the animal matter which forms the basis of osmazome has not yet been clearly described, I have thought it most prudent to retain the original expression.

The fecula is purified from the potash salt by continued washings with distilled water, and after having been dried, is to be added to the portion not taken up by the *liq. potassæ*, and carefully weighed.

To determine the proportion of earthy and saline matters, 100 of ergot are to be completely burned in a covered platinum crucible, and the residue tested in the usual way. It has scarcely ever exceeded three grains, one of which has usually been silica, and the other two, phosphates of soda and lime.

My analysis has furnished me with the following constituents and their proportions.

Thick white oil, - - -	31.00 grains.
Osmazome, - - - -	5.50
Mucilage, - - - -	9.00
Gluten, - - - -	7.00
Fungin, - - - -	11.40
Colouring matter, - - -	3.50
Fecula, - - - -	26.00
Salts, - - - - -	3.10
Loss, - - - - -	3.50
	100.00 grains.

Ergot appears to differ from sound rye, chiefly in the presence of oil, osmazome, and fungin.† I am inclined to consider the formation of the oil as in some degree dependent upon an altered condition of the farina, arising from some peculiar change which we cannot express, but which, in the absence of a better term, may be denominated fermentation. It may seem extraordinary that so remarkable a substance should be thus produced; but the fact of its formation is demonstrated by its presence, and when we remember that " unconscious particles of matter take their stations, and severally range themselves in an order so as to become collectively plants or animals," we can easily conceive it possible for a change so apparently intricate and complicated as this, under certain disposing circumstances, readily to ensue.

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* I use the word fecula for want of a better term, for, as before stated, this substance, unlike starch, does not give a blue colour with iodine, nor is it souble in dilute nitric acid.

† Rye, according to the analysis of Einhof, gives albumen, 3.27; gluten, 9.48; mucilage, 11.19; amidine, 61.09; saccharine matter, 3.27; woody fibre, 6.38; loss, 5.42, (Dict. de Mat. Med. Tome vi. p. 278.)

SECTION III.—*Natural History of Ergot of Rye.*

An explanation of the manner in which ergot is formed has been very extensively and variously attempted. Some theories have undoubtedly a greater share of probability than others, but, from the uncertainty and difficulty of experiment, it is a subject which will probably ever remain open to discussion. Lentinus[*] says, " scarabaceum solstitialem clavi genitorem eapropter habendum censuit, quod pluviosa anni tempestate greges ejus spicas oppugnent seminumque recentium succos imbibant, quo facto inebriati, quasi decidant et e seminum plagis scaturiat humor lacteus, qui aëre inspissatus et nigrescens, secale cornutum fingat."

Schreber[†] supposes the ergot to be formed by an insect, from having seen little cavities in its substance, containing insects and worms.

De Geer[‡] and Ginnani[§] favour the opinion of the insect origin of ergot, and compare its formation to that of gall-nuts. Duhamel and Ray entertain the same idea.

Parmentier thought that the disease originated in the covering of the grain; and M. de Buffon[‖] regarded ergot as an assemblage of animalculæ, having a similitude to eels.

De Münchausen[¶] added ergot to the list of fungi, supposing it to hold a place intermediate between the species " clavaria and lycoperdon," wherefore " solidam clavariam appellavit."

Decandolle[**] considers it to be intimately allied to the fungi, and gives it the name of " sclerotium clavus."

Tessier[††] and Zuckert[‡‡] attribute its generation to the combined inimical action of the air, soil, and sun.

Roessig[§§] supposes it to arise from a disordered condition of the whole internal structure of the plant.

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[*] Neues Hanöv. Magazin, 1804, i. p. 1.

[†] Oeconomische Schriften, Th. 12. p. 481, u. Th. 14, p. 362.

[‡] Abhandl. d. Schwed. Acad. d. Wissenschaft. Th. 6.

[§] Delle Mallatie del Grano in erba. Vesaro, 1759.

[‖] Histoire Nat. Tome ii. and Sup. Tomé iv.

[¶] Krumitz. Encyclop. Th. xcix. p. 289.

[**] Flore Francaise par Lamark et Decandolle. Paris, 1805–1816, Tome vi.
Fries is also of opinion that it is a fungus, and more lately the question has been very ably treated by Mr Queckett, who proposes that it shall be considered as a new genus, with the title *Ergotata*, which will belong to the sub-order Coniomycetes of Fries, and to its division Mucedines. (Annals of Natural History, March 1839.)

[††] Memoire sur la Maladie du Seigle, appelleé ergot. Paris, 1779. Traite des Maladies des Grains. Paris, 1783.

[‡‡] Allgem. Abhandl. von d. Nahrungsmitt. Berl. 1775, p. 98.

[§§] Abhandlung uber das Mutterkorn. Leipz. 1786.

Hube * imagines it to be dependent upon too small a quantity, and an undue spissitude of the juices of the plant.

Aymen † mentions as the occasional cause of ergot, the intermission of fecundation, or the coition of the sexual parts intercepted.

Robert,‡ supposing it to be produced by an impure state of the atmosphere, says its origin may be traced to the deformity of the seed, whereby the disease (finally) hangs upon a disturbance of the harmony of organization, and on the disproportion of nutriment.

The opinion of Robert respecting the formation of ergot is supported by the experiments of Willdenow, who proved that it may be artificially produced, by planting rye, during a wet and hot season, in a rich and moist soil, where it can be well watered.—"The causes, then, of this disease are chiefly to be found in heat, humid air, rich, moist soil, low situation, absence of winds, and an abundance of nutritive juices, badly assimilated. These conditions so change the vital process, that the plant is unable to produce a sound grain. More fruitful juices being received, they fill the vessels, distend them, and destroy their contractility. The power of averting and resisting injuries is lost; thickness and siziness of the humours of secretion come on, the function also dies, and innutrition supervenes. It hence happens that a plant, the reproductive power of which has been so disturbed, is unable to mature its seeds—pro semine tuber, pro normali mixtione *dyscrasiam* exhibeat. These things considered, Robert places the disease which he supposes to be the cause of ergot, in an aberration of the formative tendency of vegetables, and in an alienation of lymphatic plasticity." (Rudolph Padiera, Diss. de Secali Cornuto, p. 15–16.)

It will be perceived that the causes to which Willdenow ascribes the formation of ergot, are somewhat resembling those to which Theophrastus imputes the production of rust and mildew.§

Schnieder attributed the generation of ergot, not to the humid state of the air, but to a viscous sweetish substance, which penetrates with the dew into the grain, and occasions in it a sort of fermentation. He carefully observed its production, and discovered that, on the first and second day, the sweet matter was only adherent to the beard of the ear; on the third it descended into the husks; on the fourth it inclined a little further, and on the fifth it began to corrode the lateral parts, the bottom of the husk, and the grain itself. During other days, Schnieder saw the nourishing juice ferment with this matter, and produce a fungous substance which destroyed the grain of the rye. The seed was yet too small and too soft to resist the impression of this substance, which at last became more solid, dried up, and blackened.*

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* Der Landwirth, Th. 4. p. 493.

† Sur les Maladies des Blés. Memoires de Mathematique et de Physique, Tome iii. et iv.

‡ Rust's Magazin. Bd. 25. Hft. 1. p. 19. *sqq.*

§ "*ἐρυσίβη δὲ σῆψίς τίς ἐστι τοῦ ἐφισταμένου ὑγροῦ· διὸ πολὺ μὲν ὕσαντος, οὐ γίνεται· καταπλύνεται γάρ· ἐὰν δὲ ψεκάδες ἢ καὶ δρόσοι πλείους γένωνται, καὶ ὁ ἥλιος ἐπιλάβη καὶ ἄπνοια, τότε σήπεται· διὸ καὶ ἐν τοις ἔυπνοις καὶ μετεώροις ἧττον· ἐν δὲ τοις κοίλοις καὶ δροσοβόλοις μᾶλλον· καὶ πανσελήνοις δὲ μᾶλλον· ὅτι συνεργεῖ καὶ ἡ τῆς σελήνης θερμότης· καὶ ὅλως ὁ ἀὴρ ὑγρότερος.*"
Theophrast. De Causis Plant. Lib. iv. cap. 15.

Tillet's theory of the origin of ergot, though highly improbable, is exceedingly interesting. He discovered that many ergots contained a worm, though not visible to the naked eye, yet which he believed to have sprung up and nourished itself there. He enclosed in a glass goblet, covered with parchment, a score of these ergots, in which he had observed some small insects. They increased in size, and consumed nearly the whole of the ergot. Four of these changed themselves into beautiful butterflies, the wings, legs, and *antennæ* of which were in some places covered with white spots, and in others with spots of a rich musk colour. The butterflies were of a small kind, and such as Tillet fancied he had seen on the surface of a tub of water which was exposed to the sun, and kept for watering a garden. From this discovery he drew the inference, that butterflies of the same species have inserted into these grains of rye, the eggs from which the caterpillars have subsequently arisen: and these grains, changed into ergot by some derangement in their organization, have served to nourish these caterpillars when converted into butterflies, and that they in their turn have become the cause of many ergots when labouring for the preservation of their young. Nevertheless, he says that he has found many ergots in which he could discover no trace of insects. Here he imagines that the caterpillars perished by some accident during the formation of the ergot.†

Read, a physician in the Military Hospital at Metz, says, that he has established by experiment, the inferences previously drawn by Tillet. He thinks that the butterfly piercing the grain at the time of its developement, that is, while the interior is yet soft and immature, excites there a sort of fermentation by the fluid which it deposits. This opinion has also been maintained by Fontana,‡ and supported by General Field, who imitated the action of the flies, by puncturing the sound grains, whilst soft and pulpy, with a needle, and obtained similar results. But he remarks, "under a good microscope I occasionally examined the ergot, and also the grains of rye in every stage of decay, but was not able to discover in either the eggs or larvæ of any insect. I therefore conclude, that the puncture of the fly is for the purpose of extracting its food from the rye, and not for the deposition of its eggs.*

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* Renauldin, Dict. des Sciences Med. art. Ergot. † Ibid.

‡ Fontana, Lettre sur l'Ergot, Journ. de Phys. 7. 42.

Wiggers adopts the theory of Decandolle respecting the formation of ergot, for he discovered that the white dust which is sprinkled over the surface of the spurs, will, if applied to the roots of a sound plant, generate the disease.†

On the contrary, Hertwig, a German physician, has concluded from a series of careful experiments, that the disease is incommunicable by contact. He surrounded the ear when in flower, with the powder of spurred rye, without in any degree affecting the healthiness of the plant or its grain.‡

My own experiments correspond in their results with those of Hertwig. I have sown rye in conjunction with ergot, both in powder and in substance, without the process of germination being either retarded or modified, or anything but a natural and healthy maturation resulting. I have regularly watered rye, from the sowing of the seed to its period of ripening, with a solution of ergot, but without producing a trace of the disease. Nor does the direct application of the powder of ergot to the ears of rye seem in any way to affect them. Indeed, a solution of ergot does not appear to have any influence upon vegetables. I have watered turnips, stocks, slips of currant trees, &c. for weeks together, without injuring them in the least.

Should the experiments of Wiggers be correct, they will materially tend to establish the theory which he suggests; but on comparing the small quantity of fungin, a harmless substance, with the prevalence of oil in the ergot, the presence of which requires a different explanation, I cannot help concluding that the hypotheses which ascribe the formation of this excrescence to atmospheric warmth and moisture, are the most accordant with circumstances, and the least liable to objection. Tessier has also rendered this idea more probable, by showing from careful and elaborate investigation, that the district of Sologne, which is more exuberant in the production of ergot than any other place, is thus peculiarly adapted to its production. And it is well known that nothing so soon produces ergot as a storm of rain falling upon rye situate in a hot latitude, and in a moist rich soil.§ Further, the grains are sometimes found to be only partially ergotted, one-half being sound and the other half diseased, which is a circumstance of insuperable objection and denial to the theory of fungous growth. And Virey has found remains of stigmata upon grains infected with the spur, and has proved that the genus Sclerotium, in which Decandolle places ergot, has a character widely different from it.[*] The ergot has also a form like that of rye, and its longitudinal furrow is scarcely ever wanting; a fact which, coupled with the shining appearance of its interior, renders very nugatory the hypothesis of its being a fungus.

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* Annals of Philosophy, N. S. Vol. xi. p. 14.

† Inquisitio in Secale Cornutum, &c. Commentatio præmio regio ornata. Gottingæ, 1831.

‡ Lorinser, Beob. und Vers. über die Wirkung des Mutterkorns, 1824. Quoted in Robert's paper, 28.

§ Duncan's Med. Com. Vol. ix. p. 78.

This is perhaps the fittest place for notifying that a minute excrescence has been described as situated at one extremity of the ergot, to which its active properties have been referred. Léveillé, a French physician, published in 1827, a pamphlet in which he described it minutely. I do not think it a subject which is worth discussing; for were his opinions correct, the samples of ergot which reach us, entirely free as they are from this appendage, ought to be equally free from activity. I think there can be little doubt that the body which he denominates *Sphacelaria segetum* is a stigma altered by disease.[†]

SECTION IV.—*Toxicological History of Ergot of Rye.*

Spasmodic Ergotism.—According to the Abrégé Chronologique of Mezeray, the historian, the earliest mention we have of ergot is by Sigebert de Gremblour, who wrote upon it in 1096.[‡] Others say that its first description was in 1596 by Wendelin-Thalius, a German physician, suggested by an epidemic which it caused in the kingdom of Hesse in that year, and respecting which a treatise was published in the following year in German. In this work, the epidemic is represented as characterized—1. by a peculiar stupidness of the patients, which continued until death; 2. those who escaped death had habitual ill-health, particularly in the months of January and February; 3. the disease was contagious; 4. the bodies rapidly decomposed; 5. the disease was not confined to the human species, for animals were affected, and their chief symptom was lethargy.

The same disease prevailed in Voightland during the years 1648, 1649, and 1675.

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[*] Lond. Med. and Phys. Journ. 1817. Vol. xxxviii. 334.

[†] See Experiment 10th.

[‡] See Hildanus, Obs. 69. cent. 2. N. C. Dec. 3. Ann. 4. Obs. 234, &c. Miscel. Nat. Cur. Cent. 5. Obs. 82, and Hoffmann, Vol. i. Part, 2, Cap. 9.

[‖] In the "Recueil des Historien des Gaules, et de la France," Tom. xiii. p. 258, is the following passage, extracted from the works of Sigebert.—" 1089. Annus pestilens maxime in occidentali parte Lotharingiæ, ubi multi sacro igne interiora consumente computrescentes, exesis membris instar carbonum nigrescentibus, aut miserabiliter moriuntur, aut manibus, ac pedibus putrefactis truncati, miserabiliori vitæ reservantur, multi vero nervorum contractione distorti tormentantur."

In 1693, it raged extensively in the Black Forest, and some severe cases of it are described by Wepfer.*

The Ephemerides Curiosor. Naturæ, Dec. 3d, report, that, in 1698, many persons in the Cantons of Germany were the subjects of transient intoxication, pains in the head, continued nausea, and considerable tumefaction of the face, all of which symptoms were regarded as the consequence of eating bread that contained ergotted rye.

In the years 1702, 1716, and 1717, this disease caused by bad rye, which contained nearly one-third of ergot, almost devastated Freybourg, and overran many of the Cantons of Lusatia, Saxony, and Sweden. The villages situate on marshy land were more unfortunate than others, and the cities were least visited by the disease. According to Videlius, the patients were attacked with spasms and convulsions, accompanied with violent pains, which were said to equal those of luxation, and to be similar in their type. These pains were intermittent, sometimes having intervals of two or three days, during which period the patients were capable of following their usual employment. After the cessation of the paroxysms, there generally came on a voracious appetite; in other instances the patients became lethargic, and when recovering from such state, gave respectively signs of stupidity, intoxication, and extreme lassitude, after which the fit subsided for a time. But there generally remained vertigo, *tinnitus aurium*, *nebulæ oculorum*, rigidity of the members, and excessive feebleness. The dissections showed extravasation of blood in the chest, and traces of inflammation in the lungs. The heart presented a remarkable flaccidity, the ventricles were usually empty, and "the blood-vessels seemed only to carry bile." The liver and spleen were commonly studded with gangrenous spots.

In 1722, Silesia, in 1723, the environs of Berlin, and in 1736, Wirtemburg in Bohemia, sustained the disastrous effects of ergotism. The symptoms of the first epidemic have been ably described by M. Vater,† and those of the last, with equal precision by J. A. Scrinc,‡ who alone saw 500 individuals the subjects of its virulence. He describes the disease as commencing with a disagreeable sensation in the feet, a tingling or itching; a violent cardialgia then came on; and the disease ascended to the hands and the head. The pains in a short time subsided, the head became heavy, and vertigo prevailed,—the eyes appearing to have a thick mist before them. The patient then complained of extreme heat, which was attended with diaphoresis. The fingers and hands were so spasmodically contracted, that no ordinary force could straighten them, and the pain was described as equalling that of luxation, Some of the patients became totally blind, and others had double vision. The memory also failed, the conversation was wild and unintelligible, and the movements staggering and awkward. Some became maniacal, some melancholic, and others comatose. The disease was usually accompanied with opisthotonos, and an abundance of saliva tinged with blood, or coloured greenish-yellow, poured from the mouth. The tongue was frequently so much swollen as to impede articulation. The greater part of those who had epileptic fits died, and such as experienced sensations of coldness and rigidity in the limbs, consequent upon the subsidence of the itching, had less distension of the hands and feet. " This iliad of affections" was followed by excessive hunger, many had an insatiable appetite, and very few evinced any aversion to food. One had buboes in the neck, which discharged yellow purulent matter, accompanied with violent burning pains. Another had spots on his feet resembling the stings of fleas, and which remained during eight weeks. Some had the face extensively covered with these spots. The pulse, without one exception, was the same as in health. The disease continued for two, four, eight, and sometimes even for twelve weeks, with occasional intervals of repose. Of the 500 patients coming under the notice of Scrinc, 300 infants perished, considering as such, all under five years of age.

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* De Affect. Capitis, Obs. 109, p. 482.

† Dissertatio de Morbo Spasmodico. Siles. Wirtemburg, 1723.

‡ Satyr. Medicor. Siles. Specim. 3.

G. H. Burghard gives the following description of a convulsive epidemic which raged in the Canton of Silesia. * The patients were the subjects of excessive spasms, which convulsed the extremities, and the head, eyes, and lips in particular, attended with an aberration of reason which no medicines could restore. Rarely had the patients any remission until the third week, and the disease generally continued for two or three months with those who took no medicine, and who were not guarded in their manner of living. Those who had continued fever, and in whom profuse perspiration following the spasms prevailed, were most readily cured. Those who died, showed, previously to dissolution, a sort of paralysis, which degenerated into apoplexy. Females were more severely affected than men, and especially so during the period of menstruation. This being over, they complained of little except great debility, until the return of the menses, when the symptoms were much aggravated. Such as were fortunate enough to recover, laboured for some time under excessive debility, particularly of the joints, stiffness, and even immobility of the limbs, enfeebled intellect, &c.

In 1741, this disease raged in Germany. J. M. F. Müller gave

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* Satyræ Medic. Specim.

a very elaborate description of it, in a dissertation which was discussed at Frankfort on the Oder. * This epidemic presented symptoms very closely allied to those described by Scrinc.

In 1756, M. Blohm of Altona gave a description of a similar epidemic, but without saying where it prevailed.†

Gangrenous Ergotism.—In 1630, the dry gangrene appeared in many parts of France, often producing very fatal effects. This epidemic Dr Thuillier attributed to the incautious use of ergot of rye.

In 1650, 1660, and 1664, it prevailed in Guyenne and Sologne districts, and, during the last year especially, at Montargis, of which a report has been given by M. Perault.‡ From his account, it appears, that, whilst travelling in Sologne, he had found, from the physicians and surgeons, that the rye was sometimes so corrupted, as to form a highly injurious bread, the use of which had brought on dry gangrene, followed by the loss of the limb, and without inflammation or fever. The Academy having learnt some years afterwards that similar accidents had happened at Montargis, requested Dodart, in 1674, to investigate the circumstances. It seemed from the report of this physician, that the use of ergotted bread had occasioned vertigos, malignant fevers, heaviness, and gangrene of the extremities. The last symptom was preceded by numbness of the legs, which members afterwards became painful, and swelled slightly, but did not evince any direct signs of inflammation. The skin, on the contrary, was cold and livid. The gangrene commenced in the centre of the member, and did not attack the cutaneous tissue until a long time afterwards, and they were consequently obliged to cut through the skin to discover the progress of the disease. Dodart further observed, that the poor only were the particular subjects of this distressing malady, and that the ergot occasioned it more certainly when new, than after having been kept for some time.

In 1695, John Conrad Brun or Brunner, saw in Augsburg a female whose fingers were withered, blackened, and sphacelated from having eaten bread containing ergot of rye. The surgeon who presented this female to Brunner, assured him that the patients in the environs were attacked with resembling symptoms, which were violent in proportion to the newness of the bread. He added, that some time before, he had amputated a foot which was gangrenous from the use of ergotted bread.

In 1709, a gangrenous epidemic prevailed in the Departments of Orleans and Blesse. Noel, surgeon at the Hotel Dieu, had to treat above fifty cases, incident to adults and infants. In one case only were the fingers attacked, in every other, the disease began in the toes, and, extending gradually, sometimes reached the top of the thigh.

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* Dissertatio de morbo epidemico, convuls. contagiis. experte. Franc. ad Oder. 1742.

† De Affectu Spasmod. vago Maligno. Erford, 1756.

‡ Journ. des Sav. 1676.

In this epoch it was discovered that the internal use of ergotted bread had horribly mutilated a peasant at Blois, the particulars of whose case are described by M. de Fontenelle in the following terms. A peasant was attacked most severely. Gangrene caused first the separation of all the toes of one foot; then those of the other; next both legs and both thighs were successively detached, leaving only bones. At the time of writing the account, the cavities of the iliac bones began to be filled with good fleshy granulations.*

Noel declares that, in the year 1709, the rye of Sologne contained nearly one-third of ergot; that, as soon as the inhabitants of the country had eaten of this unwholesome bread, they became inebriated, and this was followed by gangrene; but in Beauce, where there was little or no ergot, these accidents were not common.

In the same year, (1709), from the excessive coldness of the season, this malady, ascribed to an intermixture of ergot with the bread, raged in the canton of Lucerne, and reappeared in 1715 and 1716 at the same time as in the cantons of Zurich and Berne. Of this epidemic, Langius has given the following description;—"It began with excessive lassitude, unaccompanied by any febrile action. Soon, the cold attacked the extremities, which became painful and rigid, as they are after a long immersion in cold water: the wrinkles were so marked, that even the veins could not be distinguished; benumbed, and almost insensible, the limbs were with difficulty moved. They were internally tortured with acute pain, increased either by the heat of a room or of a bed, and which did not subside until the patient had been long exposed to a low temperature. These pains extended by degrees to the hands, arms, and shoulders; and from the feet to the legs and thighs, until the parts affected became dry, sphacelated, and attacked. Some victims of this plague found in their gloves or stockings, one or two of the digital phalanges separated by gangrene. Throughout the progress of the disease, the other organs of the body were in a healthy condition, except, that, as the pain increased, the patients experienced slight febrile heat, afterwards a copious sweat, which extended from the top of the head to the pit of the stomach, and lastly, a disturbed sleep, agitated by frightful dreams, particularly after warm food. This affection, tortured with equal severity all its victims; but those with whose food ergot had been sparingly mixed, were only affected with a feeling of weight in the head, and drowsiness, to which often succeeded transient intoxication."

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* Hist. de l'Acad. Roy. 1710, 81.

Du Hamel, on the authority of Mulcaille, in the Memoires de l'Academie Royale des Sciences, anneé 1748, has described a fatal epidemic which in 1747 raged in Sologne, destroying the greater number of its inhabitants.

Salerne, a physician at Orleans, and Corresponding Member of the Academie Royale des Sciences de Paris, gave also, in 1748, to that Academy, an interesting memoir on the diseases produced by ergotted rye.* From his report it appears, that about the middle of August, in the year preceding, he commenced treating in the Hotel Dieu, patients threatened, or attacked with gangrene, more than two-thirds of whom were men. A child, ten years old, lost both its thighs, which were detached from their articulations without any hemorrhage. Its brother lost the leg and thigh of one side, and the leg of the other. Both died in twenty-eight days from the commencement of the disease. In every case, amputation rather accelerated than retarded dissolution. Of more than 120 patients, operated on or not, but 4 or 5 escaped. During the time that he gave his memoir, he had three or four cases in which the feet fell off, yet the appetites of the sufferers were not diminished. He saw one man, about forty-five years old, who, eighteen years before, lost the left hand and wrist; he had a large, hard, and tense belly, his right hand was numbed, but he had a creeping sensation in it. Most of his symptoms were relieved, except the numbness, but he returned to the hospital shortly afterwards, his disease being aggravated. Salerne observed that most of the patients were dull and stupid, scarcely able to describe or to define their sufferings; the skin was generally yellow; the face and the conjunctiva being more decidedly tinged than the other parts: the belly was hard, tense, and stretched; emaciation rapidly came on, nevertheless the alvine and urinary evacuations were regular and copious, the latter being natural, the former coherent and imperfectly digested, until within three or four weeks of death, when diarrhœa supervened, not unfrequently accompanied with colic pains; the appetite was usually good, and the sleep natural; the pulse was hard, but often imperceptible, although the vessels appeared swollen and distended, and the blood, whether emitted from a large or a small orifice, was slimy in its consistence, and tardy in its escape.

In 1749, there prevailed in Bethune, a disease very closely resembling gangrenous ergotism, and which had every appearance of having originated from the same cause.

In August 1764, the dry gangrene made destructive ravages in the environs of Arras and Douai. The disease, according to the report of Read, † was announced by sharp lancinating pains in the extremities, little swelling or local inflammation being present, but general fever commonly prevailing. This first stage lasted from ten to fifteen days. In the second period, which continued during eight or ten days, the pains commonly ceased, and the extremities became numbed; the limbs were then greatly reduced in temperature, but were not relieved by the application of external warmth. The third stage manifested itself by the developement of blisters, quickly succeeded by gangrene of the toes, which made rapid progress, extending over the whole surface of the foot, stretching to the leg, and sometimes even reaching the middle of the thigh. During the third period, the feet, legs, and hands detached themselves from their articulations, and the pulse was generally small and hard. Read saw two children, twelve months after their attack, begging at Valenciennes; the youngest had lost one leg and both feet, the other had lost only a leg. Two eminent physicians, Larsé and Taranget, commissioned by the state of Artois to institute means best calculated to prevent the spread of the disease, ascribed its entire origination to the use of bread contaminated with ergot.

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* Mem. de Mathemat, et de Phys. Tome ii. 55. † Traité du Seigle Ergote. 82.

Dr Vetillart, who, in 1770, published a work upon the treatment of gangrenous ergotism, gives the following example of its virulence.

A poor man of Noyen in Maine, seeing a farmer sifting his rye, begged permission to carry away the refuse to make bread of it. The farmer represented to him that this bread might be detrimental to him; but necessity prevailed over fear. The poor man ground these siftings, consisting mostly of ergot, and made bread of the flour. In the course of one month this unfortunate person, his wife, and two children perished wretchedly. A third at the breast, and which had eaten panado of this flour, escaped death, but it was deaf, dumb, and deprived of two legs.

MM. Model,[*] Schlegel,[†] and Parmentier,[‡] having stated their disbelief in the noxious properties of ergot, and especially in its tendency to produce gangrene, Tessier submitted a second paper to the Societé Roy. de Med., Tome ii. 587; experimentally illustrative of his previous views, and confirmatory of the popular belief in the injurious effects of this diseased grain.[§] These experiments were instituted to answer the sceptical inquiries of the age in which he lived, though more than a century antecedently.

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[*] Recreat. Chim.

[†] Journ. Encyclop. Juin 1771.

[‡] Addit. Aux récréat. Chim. du Model.

[§] His experiments are in favour of the notion, that ergot is actually destructive of animal life; and that gangrene in various external organs is consequent upon its protracted use. His views upon spasmodic and gangrenous ergotism are amply confirmed by M. Hoffman, (Path. gener., part 2, cap. 9.)

Dr Thuillier affirmed that he had given ergot to many animals, all of which perished from its effects.* But the memoir which Dr Salerne presented to the Academy in 1748 is perhaps equal to any one written prior or subsequent to it. This physician intermixed some ergot with appropriate food, intending to feed with it a young pig, which was lively, and in good health. As he refused on the first day to take his food, they were compelled to make him swallow it with a spoon; but at the end of five days he took it readily, so that during one month he swallowed daily three pints of the mash. At the commencement of the trial, he thrived perceptibly, but so soon as they took away the bran, only with the intention of giving him more barley, in which there was one-third of ergot, he ceased to grow. At least his belly only augmented, which eventually became large and hard. At the end of five days his legs began to redden and inflame, exuding a greenish fluid of a disagreeable odour, which grew rapidly worse. The parts under the belly blackened, the tail and ears dropped, but the alvine and urinary dejections were ordinary in quantity and natural in kind. After having eaten in the space of a month, two bushels of rye, (Orleans measure,) containing one-third of ergot, he was put upon pure bran, in the form of a tepid mash; but this change of food failed to re-establish him; the poison had accomplished its effect, and although the animal at first appeared a little better, he was evidently the subject of pain and uneasiness; his walk was unsteady and tottering, and the powers of life gradually declined, until their final termination in death. On opening the body, part of the mesentery, the jejunum, and especially the ileum, were found inflamed. The acute margin of the liver presented two large dark-coloured spots. Under the throat, and in the legs, were some unhealthy open tumours, from which exuded a reddish puriform discharge. There was no gangrene of the feet.

This physician learned from a lady, whose charitableness was often exercised in attendance upon those who were suffering from the diseases consequent upon eating ergotted bread, that the dogs to which she had given some of this bread the day before, would not leave the yard, and that two days afterwards, a couple of them were found dead. The others would also have died had the poisonous food been continued, the ill effects of which ceased only after many days use of good and nutritious diet. This lady further asserted, that the ears and feet of a pig had fallen off, from eating twenty-four bushels of barley, which had a notable intermixture of ergot.

Dr Read fed during five days a pig three months old, with ergot mixed in his mash. The animal did not go out of the stye, his eyes were suffused with tears, and an acrid serous humour poured from his ears. On the 17th day, dry gangrene had attacked the left ear, which fell off on the day following, and on the 19th the animal died. Upon examination, the abdominal viscera were found in a swollen state, and a gangrenous spot, an inch in diameter, was discovered upon the liver. This physician further states that he made a strong decoction of ergotted rye, which he mixed with an equal quantity of syrup, and that flies died in two or three minutes after tasting it. [*]

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* Journ. des. Savans pour l'anneé 1676.

Spurred Indian corn is said to produce similar diseases to those occasioned by spurred rye.—Christison on Poisons, p. 836, 3d edition.[†]

Though the authors, who have respectively detailed the diseases consequent upon the alimentary use of ergot, have ably illustrated the natural, statistical, and medical history of the substance, so as not to require me to dwell longer on these heads, yet it is somewhat incumbent upon me, in connecting together these interesting and valuable records, to determine, if possible, their verity of character, to divest the narratives of any admixture of exaggeration, and to give upon the pages of a work amenable to the judicature of established science, results as satisfactory as common experiment and inference can supply. Notwithstanding that most of the diseases regarded as the effects of ergot have been so proved, I am decidedly of opinion, that in numerous instances these diseases have had origins widely different and distinct. In many of the provinces where spasms and gangrene have prevailed, ergot has been sparingly, and in others, not at all produced. In some instances, the season of the year in which these diseases have prevailed, renders it extremely improbable that ergot, admitting its use, could have retained sufficient activity to qualify the virulence which history and tradition have ascribed to it; and in others, the very sparing employment of bread supposed to contain it, would require to produce such notable effects, even a greater degree of activity on the part of the drug, than its toxicological history will authorize us in effecting. As a proof of the difficulty experienced in determining the etiology of dry gangrene, we repeatedly see it confounded with other diseases, widely different in their cause, but having a remarkable similitude in their appearance, viz. the "mal des ardens," and the "ignis sacer," called also, "feu sacré," "feu St Antonie," and "feu d'enfer"—both modifications of erysipelas, but commonly having a gangrenous termination. The latter appears to have been first observed in Paris in 947. It is said to have attacked all parts of the body, destroying the patient with the most torturing and afflicting pains. About the year 1000, this disease prevailed in Lorrain. It was characterized by a sense of burning heat, the affected parts subsequently becoming gangrenous.

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[*] I have repeated this experiment scores of times, but have not in one instance found any deadly consequences. I think Dr Read must have been a very fortunate experimenter.

[†] Gallinæ quæ illud Maïs peladero comedunt, sæpissime ova gignunt testis orbata. Primo intuitu difficile est intellectu, inquit Roulin, qua ratione illa nutrimenti species effectum exserere possit in formationem carbonatis calcis, quo vulgo ovum est incrustatum;—attamen ex eo satis bene res mihi videtur explicanda, si statuamus, triticum illud cornutum hoc in casu excitare partum præcocem et intempestivum; verbo, illud contractionibus eo ducere organa ovis producendis destinata, ut ovum ab ovario separent antequam illi occasio fuerit et tempus, terrestri involucro se obtegendi. (Specimen Medicum Inaugurale, de Secali Cornuto, auctore G. Ter. Horst., p. 19-20.)

Sigebert de Gremblour states, that, in 1089, the *feu sacré* ravaged the eastern part of Lorrain. In some instances the limbs dropped off, in others, the patients suffered only from contractions of such parts. In the epidemic of Dauphiné in 1089, its visitancy gave rise to the formation of the order of Saint Anthony; and tradition states, that one of the sufferers lived several days with his head and trunk only remaining, all the limbs having separated.

Again, we are not justified in concluding that the diseases, when they occurred in those instances where ergotted rye was used, were solely in consequence of the deleterious impression of the grain itself. The bread was poor, and sometimes almost innutritive, hardly, indeed, calculated to sustain the physical energies of the peasantry, compelled to subsist upon such crude and unwholesome aliment. And when we consider the fearful train of diseases which defective nourishment induces, we need not hesitate to infer, that, in many instances, the supposed ergotism was occasioned, as M. Gassoud observes, by the people "in order to avoid actual famine, being compelled to live upon a sort of bread made of the meal of acorns, of grape stones, of the roots of fern, and other such crude and innutritious substances."

To prove the succession of pestilence to famine it is scarcely necessary to quote the apothegm, "pestis post famem." The records of history furnish proofs which abundantly substantiate the notion.

"He that abideth in this city shall die by the sword, and by the *famine*, and by the *pestilence*."[*]

In the year of Rome 300, a fearful pestilence was the melancholy effect of previous famine.[†]

About the year 407 or 408, near the close of the reign of Arcadius, a plague, consequent upon famine, is said to have prevailed in every quarter. Nicephorus, in his description, affirms that almost all Europe perished. " Pasa de oleto e Europe"—and very considerably of Asia and Africa.

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[*] Jeremiah, ch. xxi. v. 9.

[†] Livy, lib. iii. 32.

In 590, the severest drought ever known visited Italy, lasting from January to September. A famine was the result, and a deadly plague succeeded. Of this pestilence died Pope Pelagius.*

In 987, an unfavourable season caused a sad dearth in the harvest. The subsequent scarcity of provisions caused a multitude of diseases—malignant fevers prevailed, and the cattle died of fluxes.†

In 1084, there was a famine, which was succeeded by a severe pestilence. The latter destroyed the whole of the army of the Emperor Henry at Rome. In the following year, the defective crops in England caused a great mortality amongst cattle.

The epidemic of 1596, which is by one party regarded as the sole offspring of ergotted rye, is, by a very high authority also declared to have been caused by famine.‡

In the year 1600, pestilence raged in almost every part of Europe. Many of the symptoms were precisely those of ergotism. The patients were senseless, the hair fell off, livid spots appeared, and the limbs mortified. But we have no mention of ergot.§

In the description given by Gregorius Horstius of the epidemic febrile disease, accompanied by spasmodic convulsive symptoms, in which, or in epileptic fits, the patients died, no allusion whatever is made to ergot. Bad bread is simply notified amongst other sorts of crude and unwholesome diet. " Causas hujus affectus quoad attinet, ex ægrotantium relatione scire licet, quoad externa causa communiter in alimento, ad nutriendum minus idoneo et improportionato, consistat, dum pauperis rebus ad vitam necessariis destituti, panem impurum et male coctum longo tempore, in summâ famis urgentiâ, devorant, interdum etiam poma acerba et austera, fungosque et similia deglutitientes, sese eduliis crudis, immaturis, et astringentibus ingurgitant, de quorum depravatâ concoctione cruditates abortæ."‖

A similar report of this epidemic is made by Sennertus in his chapter, " De febre maligno cum spasmo." And upon reading the allusion which Wepfer makes to the epidemic that raged in the Black Forest in 1693, I do not find the least mention of ergot, nor does that learned author appear to have been at all acquainted with it. Camerarius also positively asserts that the dry gangrene was frequently observed in the extremities of persons who had certainly not eaten any ergotted rye.¶

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* Webster on Epidemic Diseases, Vol. i. p. 146.

† Brompton, Angl. Scrip. 878.

‡ Short on Air, Vol. i.

§ Webster, Vol. i. p. 273.

‖ Greg. Horst Opera, Vol. ii. lib. viii. obs. 22.

¶ Acad. Nat. Curios. Cent. 4, obs. 82.

Admitting, however, that these are cases still unsettled and disputable, we have recorded a very remarkable instance of gangrene having a strong similitude to that induced by ergot, but certainly not arising from it. And the only cause which can be assigned is that of imperfect nutrition, from the unwholesomeness and impurity of the bread. This case occurred in the year 1762, in the family of J. Downing, residing at the village of Watisham, the particulars of which are given by Bones,[*] Wollaston,[†] and Parsons.[‡] From their reports, it appears, that the father, mother, and six infants were seized with violent pains in the feet, legs, and thighs, the other parts not suffering materially. The affected limbs grew black, gangrenous, and fell off. The father, most triflingly attacked, was fortunate enough not to lose a limb. A child four months old died before any of the members separated. The mother, three girls, and two boys, lost collectively seven legs and four feet. The Rev. Mr Bones, minister of the parish, in answer to questions put by Dr Baker, states, that they made their bread the summer before, of what is there called clog wheat, for they had no rye. The grain was damaged, it had been laid, gathered, and thrashed separately; it was not mildewed or grown, but discoloured, and smaller than the rest. It made bad bread, and worse puddings.[§]

These facts I have submitted, not to invalidate what so many have attempted to establish, the destructive nature of ergotted rye, but to show the probability of spasmodic and gangrenous ergotism having in many instances arisen from food imperfectly nutritive, as well as actually poisonous. And, therefore, to endeavour to lessen the popular prejudice which has so long presided over its history, by showing, that the maladies recognized as its production, have, in the greater number of instances, been the conjoined offspring of deteriorated grain and defective nutriment, I have been led to this train of reasoning from the fact of my own experiments by no means corresponding in remarkableness with those reported by the continental writers upon the same subject. And, without enlarging further upon matters at all problematical, I shall proceed to a faithful detail of my own experiments, from which will be attempted to be drawn whatever inferences are most correspondent with their character and kind.

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[*] Philosoph. Transac. Vol. lii. Nos. 84 and 85. [†] Ibid. Nos. 83 and 98.

[‡] Med. Museum, Tom. i. p. 442, Tom. ii. p. 449.

[§] See Gentleman's Magazine for 1763, Vol. xxxii. p. 492.—Besides there are other seeds which have a tendency to induce diseases similar to gangrenous and spasmodic ergotism, and which in many instances have been intermixed with the grain, the farmer unknowing of their banefulness. Amongst these, perhaps the most remarkable is the *Raphanus raphanistrum*, which grew in vast abundance amongst the barley in the kingdom of Sweden during the years 1746 and 1754, when a disease precisely similar to spasmodic ergotism prevailed. And Linnæus, to discover its physiological influence, gave some of it to fowls, which, in consequence, suffered from strong and painful convulsions. He hence denominated the disease Raphania, (Amæn. Academ, Vol. vi.) which term has since been employed by Dr Cullen, who, however, wisely questions whether it be the same as the *Necrosis ustilaginea*, by which Sauvages has denominated ergotism. (See Cullen, Nosol. Meth. Gen. 52. Sauvages, Nosol. Meth. class 10, gen. 39.)

And Dr Tytler has shown that degenerated rice is capable of producing diseases very similar to those of ergotism, both spasmodic and gangrenous. He fed a healthy young goat with ouse rice, which diminished its appetite, caused excessive thirst, weakness, stupidity, watery eyes, and apparent suffering. The animal died in forty-two hours from the commencement. The only morbid appearance of moment was an " erythematic inflammation," extending from the stomach to the intestines.

In several instances the effects of this degenerated rice upon the human subject were very serious. (Remarks on Morbus Oryzeus, 4820, 8vo, p. 80.)

And Dr Peddie of Edinburgh has kindly furnished me with a pamphlet which he published, illustrative of a case of dropsy and gangrene occurring in a family from eating unsound potatoes. (See Edin. Med. and Surg. Journal, No. 115.)

SECTION V.—*Physiological action of Ergot of Rye, illustrated by Experiments.*

These experiments I have divided into two classes; *1st*, the immediate injection of ergot into the system by the arteries and veins; and *2dly*, its mediate introduction by the stomach, skin, and rectum. The former will be subdivided into three orders, comprising solutions of different degrees of strength, which will be particularized in each respective trial. The latter will form two subdivisions, embracing large and single doses, to determine the direct effects of the drug; and small continued ones, to illustrate its eventual or remote influence upon the animal system.

Injection of Ergot into the Veins.—Expt. I.—Three-quarters of an ounce* of ergot of rye were infused in three ounces of water, † slowly evaporated until only half an ounce remained, which, after filtration, was injected into the right external jugular of a bull-terrier bitch, weighing seventeen pounds. She cried and struggled violently on receiving it, the urine flowing in a full stream, the pupil dilating immediately, the pulsations of the heart being too rapid to be counted. In four minutes its action was much diminished in force and frequency, and general muscular flaccidity prevailed, with slight quivering of the whole frame. In another minute the heart again beat with singular rapidity and force, during which complete opisthotonos came on. After the lapse of another minute and a half, she cried in a plaintive tone, the heart beat slowly and laboriously, the breathing was remarkably slow and profound, and under these symptoms the animal died, in exactly nine minutes from the period of injection.

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* Whenever the word ounce is used throughout this treatise, it implies an ounce apothecaries' weight.

† My mode of preparing this solution, whether for physiological or obstetrical purposes, consists in mixing the ergot, previously reduced to a fine powder, with cold water, and slowly heating it until near the boiling point. At the temperature of about 200° it is maintained for a few minutes, then poured into a strainer, and forcibly squeezed whilst hot. As the active principle of ergot is volatile, its aqueous solution should never be allowed to boil.

Autopsy.—All the muscles of voluntary motion retracted from the knife. The heart was firm and rigid, but insensible to galvanism, whether transmitted, or from a closed circuit. The right cavities contained venous, and the left ventricle, arterial blood. The lungs had a natural appearance, but the trachea was lined with abundance of frothy mucus. The intestines were contracting vermicularly when exposed, and, as well as the stomach, had a natural appearance throughout. The other abdominal viscera were apparently healthy. The mouth was very livid and frothy; the pupil was dilated, and the conjunctiva reddened. The *dura mater* was slightly injected, but the other membranes of the brain and its substance exhibited nothing remarkable. The spinal chord was exposed throughout its whole extent, but it displayed no evidences of alteration.

Expt. II.—I intended to inject a strong solution of an ounce of ergot into the jugular vein of a shepherd's dog, weighing twenty-four pounds; but when the first syringeful had passed, which did not contain above half the quantity, excessive spasmodic action ensued, with dilatation of the pupil and discharge of feces. In three-quarters of a minute the convulsions had ceased, and there was only to be observed the most perfect helplessness and flaccidity of the limbs, with a quick and feeble pulse. This state continued through the further period of half a minute, when very slight tremor of the muscles of the hind and fore-legs succeeded, accompanied with a drawing down of the lower jaw, and perfect emprosthotonos. The motion of the heart was now very slow and intermittent; the emprosthotonos, with an occasional convulsive sigh, continued until four minutes and a half from the commencement, when all signs of life were gone.

Autopsy.—The pectoral muscles contracted remarkably when cut. The heart was quite still, but, after having been incised, began to pulsate, and continued to do so for sixteen minutes. Its right cavities contained venous, and its left ones arterial blood. The thoracic and abdominal viscera were natural. The brain was slightly injected upon the surface only. The spinal chord exhibited nothing remarkable. This experiment was witnessed by Mr Walker, Surgeon, of Bulwell.

To determine whether these results were at all influenced by the mere presence of foreign matter in so concentrated a form, without respect to any poisonous quality, I tried the following experiment, which satisfactorily proves that vegetable substances, not directly poisonous, may, with perfect safety, be injected into the animal system; and that the results in the two preceding trials were dependent upon an active inherent property of the ergot, not characteristic of sound rye.

Expt. III.—Three-quarters of an ounce of healthy rye were bruised, and then boiled for some time in three ounces of water. The solution was then well squeezed through a coarse strainer, and when cool, injected into the jugular vein of a spaniel bitch, weighing sixteen pounds. With the exception of a slight increase in the action of the heart, and hurried respiration, she appeared to be unaffected by it. The wound healed readily, and during the three remaining weeks that she was allowed to live, no signs of injury appeared. This experiment I repeated, with similar results, in the presence of Mr Walker.

Expt. IV.—Three drachms of ergot were infused in as many ounces of water, evaporated to one ounce and a half, and when tepid, the liquid was slowly injected into the right jugular vein of a terrier dog, weighing fourteen pounds. Its introduction was almost immediately followed by heavy and laborious breathing, with increased action of the heart, its beats amounting to about 100 in a minute. The pupil was dilated at first, but soon contracted again. In ten minutes, he cried out wildly, and violent convulsions of the whole frame succeeded at intervals. Five more minutes passed over, his breathing continuing to be heavy and laborious, the action of the heart being quick and violent. He was perfectly unconscious, the eye was fixed and insensible to the touch, feeling, indeed, was quite gone; for punctures made in different parts of the body furnished no indications of suffering. In twenty minutes the heart began to falter, respiration diminished in frequency until it became unobservable, and in this state he continued without any alteration, until two hours and a quarter from the first injection, when life became wholly extinct.

Autopsy.—All the voluntary muscles were sensible to galvanism, as also the auricles, but not the ventricles of the heart. The latter organ was flaccid, containing venous blood in all its cavities. The lungs were dark-coloured and engorged, and the bladder was excessively distended with urine. The other viscera were natural. The membranes of the brain were slightly injected, and both lateral ventricles contained a little serous fluid, slightly coloured. A similar effusion was found upon the surface of the brain. I could discover nothing unusual in the spinal chord.

Expt. IV.—A solution furnished by half an ounce of ergot in three ounces of water, was slowly injected into the femoral vein of a large bull-terrier bitch, weighing twenty-three pounds. About half an ounce of the fluid was propelled at once, to each of which injections the system answered by very increased arterial action, and quick, hurried respiration. The first injection also produced violent convulsive movement of the whole body, but the hind-legs were chiefly affected. The urine and feces flowed abundantly, and the animal cried in a plaintive and agonized tone. The convulsions lasted for about three minutes, when the dog became still, the whole frame relaxed, being totally insensible to pain. The pupil was dilated and motionless, the action of the heart scarcely audible, the respiration slow and profound. In eight minutes, the pulsations of the heart became distinct, and the respiration was hurried and difficult. In four minutes more sensibility returned to the anterior part of the body, and the animal stirred its fore-legs; the posterior extremities remained motionless and insensible. The pupils were excessively dilated, and the eyes glared hideously. Sight and hearing were, however, restored; for the dog watched my movements, and was startled by a sudden or loud noise. At this period the body was cold; in a short time the sensibility of the fore legs was again lost, the eye became fixed and glazed, the motions of the heart were feeble and quivering, and a rattling in the throat announced the period of dissolution. A little diluted spirit was now (half an hour from the commencement) poured down its throat, which seemed to operate as by enchantment. In a few seconds, the breathing became free, the motions of the heart were accelerated, the energies of the system were revived, and, as if invested with new life and vigour, the animal in a minute or two was upon its legs, followed me when called, but whined piteously from the wounds on its surface of which it was now sensible. The fore legs were moved with perfect freedom, the hind ones were not fairly lifted, but dragged along. It thus continued for about quarter of an hour, when paralysis again returned, and increasing progressively, terminated the function of animal life in exactly one hour and thirty-five minutes from the first injection.

Upon this experiment I may remark, that I have often succeeded in averting for a time the effects of an injection of ergot, by the exhibition of continued doses of stimuli; but I have never thus recovered an animal, to which a strong solution of ergot had been given, although its influence has certainly been modified. When weaker solutions have been employed, I am persuaded that this treatment has considerably facilitated resistance of the poison.

Expt. VI.—Five drachms of ergot were infused in four ounces of water, and the liquid when cool was rapidly injected into the left external jugular of a bull-bitch, weighing twenty-two pounds. Soon after its introduction the heart beat violently, sometimes intermitting, and again leaping excessively. The breathing was heavy, and considerably accelerated, the pupils widely dilated, and in about four minutes and a half the power of voluntary motion was completely lost. The abdominal muscles were violently convulsed, the urine and feces at the same time passing abundantly. After the fecal evacuation, the tail began tremulously to move, and, increasing in force, at last waved rapidly from side to side. In seven minutes from the first injection, the *sphincter ani* contracted powerfully, and there was every appearance of severe tenesmus, which symptom was greatly augmented by touching the hind-legs or tail. The pupil was still dilated, the eye fixed and motionless, and, as well as every other part of the body, apparently insensible to pain. Even the hind-legs, which were convulsed slightly when touched, were freely incised without occasioning any symptoms of torture. In fifteen minutes, stertor came on, and there was a copious discharge of mucus from the nose. The heart was beating slowly, the pupils were contracted, and all the muscles except the *sphincter ani* were flaccid and powerless. In half an hour the animal had a copious bloody evacuation, accompanied with severe and protracted tenesmus. In forty minutes, the abdominal muscles became relaxed, the contractions of the *sphincter ani* ceased, and the tail in spasmodic movement made a complete circuit towards the back, in which position it continued, fixed in the most unyielding rigidity until death, which followed in three-quarters of an hour afterwards, the animal having survived the injection one hour and twenty-five minutes.

Autopsy.—The stomach was remarkably distended with air, and its mucous surface was coloured from the presence of deeply injected blood-vessels. Spots of a darker hue variegated its pyloric extremity. The intestines were in vermicular motion, and when opened, exhibited a deep-claret colour throughout their entire mucous surface. The tinge was deepened towards the rectum, at the extremity of which it was nearly black. The latter bowel contained an appreciable quantity of bloody mucus. The bladder was empty, and with all the other abdominal organs, natural in appearance. The heart was flaccid, containing dark blood in all its cavities. The lungs displayed no particular traces of engorgement, but wêre much darker than usual. The membranes of the brain were reddened from injected vessels, the lateral ventricles contained a little bloody serum, but the substance of the brain, as also the spinal chord, was in every respect natural. This experiment was performed in the presence of Mr Bowker, surgeon.

Expt. VII.—Three drachms of ergot were infused in four ounces of water, and by careful evaporation the quantity was reduced to three ounces. This measure was slowly injected into the left external jugular of a bull-terrier dog, weighing twenty-five pounds. The animal bore the introduction of the whole quantity without exhibiting any signs of suffering, or even of physical disturbance, very slight acceleration of the pulse excepted. There was neither spasm nor convulsive motion of any kind. In the lapse of ten minutes every limb was flaccid and powerless; the breathing was natural, and the dog lay, giving no indications of pain, but was in the most complete state of paralysis. The hind-legs were totally insensible, and the susceptibility of the fore extremities was very trifling. The pupil was slightly contracted, insensible to light, and the eye was scarcely affected when touched. In this state he continued for half an hour, when reaction came on, and sensibility was in some degree restored. He rose upon his fore-legs, but, on attempting to support himself on the hind ones, fell. In a sitting posture, then, he crawled a few yards, using only the anterior part of the body, the posterior extremities being scarcely moved. In three-quarters of an hour the limbs again became weak and useless. The body grew cold, and the pulsations of the heart were indistinct and fluttering. The respirations gradually diminished in force and frequency, until they became imperceptible; and the feeble action of the heart, with an occasional sigh, was the only indication of life's continuance. Eventually, however, the heart ceased to beat, the termination of its functions marking the intervention of two hours and eighteen minutes between the commencement of the experiment and its close.

Autopsy.—The muscles of the posterior extremities were only very slightly affected by galvanism; the anterior part of the body was more susceptible, yet it was evident that irritability was in a great measure exhausted. The heart was uninfluenced by stimuli, flaccid in its texture, containing venous blood in the right cavities, and in the left ventricle arterial blood. The lungs had a natural appearance, but the trachea contained much frothy mucus. The stomach was distended with flatus, as also the bladder with urine, but nothing unusual was discovered in any of the abdominal viscera. The membranes of the brain, its substance, and the spinal chord, were in every respect natural. This experiment was witnessed by Mr John Wright, surgeon.

Expt. VIII.—Two drachms and a-half of ergot were infused for some time in two ounces of water, and the solution when tepid, was injected into the right external jugular of a terrier dog, weighing eleven pounds. The whole of the liquid was passed without any evidence of injury, but in about six minutes the dog was in a state of complete paralysis, voluntary motion being entirely suspended, and sensibility lost in every part except the head, face, and neck. The pupil was not affected, nor did the sight appear to be at all diminished. In twenty minutes, the sensibility of the eye began to decline, and its glassy fixed state indicated the mischief that was impending. The heart was almost unaffected until the lapse of half an hour, when its pulsations became slow and feeble, the respirations at the same time diminished in force and frequency. In forty-five minutes the animal was quite cold, the heart and lungs continuing their functions in a body apparently dead. The dog remained in this state through the further period of half an hour, having survived the experiment one hour and a quarter.

Autopsy.—Muscular irritability was very slight. The heart was soft and flabby, containing in its right cavities venous blood, the blood on the left side being much darker than arterial. The mouth was very livid and frothy. A most careful examination was made of every other part of the body without the discovery of anything unusual. This experiment was performed in the presence of Mr Henry Taylor, surgeon.

In repeating these experiments, I discovered in two instances, that the paralytic state of the hind-legs may be considerably relieved by a stimulant injection. The dogs were quite unable to stir their hind-legs, when an enema of spirit in one instance, and of dilute ammonia in the other, restored for nearly an hour their motility, and for a much longer period their sensibility. Both, however, subsequently died.

*Injection of Ergot into the Arteries.**—*Expt.* IX. Half an ounce of ergot was infused in three ounces of water, and the solution, after a reduction to two ounces, was carefully injected into the right carotid artery of a fine bull-dog, weighing thirty-eight pounds. Upon receiving the first syringeful he cried loudly, and struggled with convulsive violence. The pupils immediately contracted, but in a few minutes dilated again. Each injection produced similar effects, and when the whole quantity had passed, the pupil remained contracted, and abundance of froth issued from the mouth. In five minutes, the heart's action, which a short time before had been hurried, became slow and heavy; the pupil was at this time so contracted as to be scarcely discernible. The breathing was stertorous, and scarcely any part of the body was susceptible of pain. Respiration gradually became more slow and profound, until thirty-five minutes had elapsed from the commencement, when life was terminated. Sensibility of the body in this experiment was not materially influenced until twenty minutes from the first injection.

Autopsy.—All the muscles readily retracted from the knife. The heart was tolerably firm in its texture, the auricles were remarkably sensible to galvanism, but the ventricles, before and after the evacuation of their contents, were unaffected by it. All the cavities of the heart contained dark blood. The lungs were engorged, and the trachea contained much frothy mucus. All the abdominal viscera were natural, except the gastro-colic-omentum, between the folds of which was a large quantity of extravasated blood. All the mesenteric veins were highly turgid. The *dura mater* and *pia mater* were diffusely reddened from minute injection; the vessels upon the surface of the brain were congested; and the substance of this organ exhibited throughout its structure many distinct traces of extravasation. The ventricles contained only as much serum as was requisite for the lubrication of their inner surfaces. I could discover nothing unusual in the spinal chord. This experiment was performed in the presence of Dr John Percy.

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* Without giving a separate detail, I may observe, that I have injected a pretty strong solution of sound rye into the arteries, without producing any effect, except contraction of the pupil and tendency to sleep.

Expt. X.—A solution furnished by half an ounce of ergot* infused in four ounces of water, and carefully evaporated until only an ounce and a-half remained, was injected into the left carotid artery of a bull-terrier bitch weighing seventeen pounds. As the fluid passed, and before it was wholly transmitted, she yelled vehemently, and was the subject of strong convulsions. The pupil contracted instantly; the heart beat with increased activity, and the respiration was hurried and difficult. The urine flowed copiously, and the feces were discharged with severe tenesmus. Complete paralysis, with total loss of sensibility, resulted in less than a minute. In four minutes and a-half she fetched a deep sigh, the jaw was drawn down, and partial emprosthotonos appeared for a few seconds, when suddenly the muscles were relaxed; and the animal was dead.

Autopsy.—The appearances were almost identical with those in the last experiment, the effusion of blood in the abdomen excepted.

Expt. XI.—Three drachms of ergot were infused in three ounces of water, and the solution obtained was rapidly injected into the left carotid artery of a shepherd's dog weighing twenty-three pounds. The greater part of the fluid passed without producing any marked symptoms; but whilst the last syringeful was discharging, slight convulsions came on, with deep sighing and accelerated motion of the heart. In five minutes after the injection had been completed, hiccup prevailed, and the animal vomited a good deal of bilious matter. Afterwards, general twitching of the whole frame appeared, not amounting to convulsion, but having somewhat the character of rigor. All the hairs along the spine became erect, and stood at right angles with the skin. The tail moved tremulously for some time, and then described a curve towards the back. In fifteen minutes from the commencement, paralysis of the hind-legs came on, but during a further period of twenty minutes, neither the motility nor the sensibility of the anterior part of the body was impaired. The pupil dilated without previously contracting, and it was not until ten minutes before death, that the eye was insensible to external impressions. Very little alteration was observed in the motions of the heart, though the respiration was much slower than usual. The skin for half an hour prior to dissolution was quite cold, and remarkably loose. No further symptoms occurred worthy to be particularized, until the death of the animal, which happened in two hours and forty-five minutes from the first injection.

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* The ergot in this instance, as in several others, had been well washed with cold water, to discover whether any diminution of activity would be the consequence. The results need no comment.

This mode of inquiry was suggested by the reports made upon the influence of the "sphacelus," which, when removed by washing, has been said to leave the ergot totally inert.

Autopsy.—Excepting the presence of venous blood in the left cavities of the heart, there was no appearance meriting notice. The brain even was natural, and its membranes were but slightly marked by a few solitary vessels.

Paralysis that results from an injection of ergot into the animal system, is not always accompanied with a loss of feeling. In two instances where I have injected it by the veins, there has resulted an extraordinary increase of sensibility, so much so, that even touching the hairs at the extremity of the tail caused the animals to cry out in agony; a breeze of air produced the same effect; and again, without any apparent reason, there was a convulsive start, and a yell at the moment, expressive of acute suffering. Both these animals recovered.

In other cases, I have injected mild solutions of ergot into the arteries and veins, without producing any sensible effects whatever, —neither increase nor decrease of sensibility, no paralysis or stupor; and yet death has resulted in ten, fourteen, or twenty hours. The autopsies have failed to disclose any morbid appearances except the presence of dark blood in the left ventricle, and slight congestion in the lungs; circumstances attributable to the fact, that the respiration has diminished in a ratio disproportionate to the decrease of the action of the heart.

On the contrary, I have injected mild solutions of ergot into the arteries and veins without destroying the animals, though they have invariably looked meagre and sickly, and have never regained their previous strength or liveliness.*

Inferences.—These experiments are of so plain and pointed a nature, as to require little enlargement in verbal explanation. They appear to justify the following conclusions.

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* Dr Mackenzie informs me that he has injected a solution furnished by two drachms of ergot, into the femoral vein of a dog without any bad effects; the chief symptom being hurried respiration.

1. That solutions of ergot injected into the arteries and veins affect chiefly the brain and the nervous system.

2. Both may be influenced together, coma, more or less perfect and paralysis appearing at once; or the spinal chord may be first affected, paralysis immediately resulting, and the brain participate subsequently, the comatose period being much delayed.

3. Its effects differ according to the strength of the solution employed. In a concentrated form it appears to paralyze the system instantly, no resistance to its effects being discernible. A milder preparation causes for a time, great excitement, the nervous energy is roused, but sinks eventually under the influence of the poison. A much diluted solution, on the contrary, produces at first no apparent effect, but seems, by a very progressive sedative action, to deprive the system of its energy, and so to exhaust it of life.

4. Its effects are produced more speedily when introduced by the arteries than by the veins. The brain then appears to be first affected, and the spinal chord subsequently; and in some instances, as in Experiment IX. stupor to a considerable extent may prevail, and yet the sensibility of the extremities be little impaired.

Ergot also appears to exert a deleterious influence upon the system through the medium of absorption, and its activity seems to be correspondent with the relative absorbent power of varied tissues, or with the sensibility of different membranes.

Expt. XII. Three ounces of a very strong infusion of ergot were injected into the peritoneal cavity of a mongrel dog. It produced but little impression for some time; but in the course of two hours he looked drowsy, his hind-legs failed, and eventually became paralytic, his fore ones were only affected with slight weakness. He frothed considerably at the mouth, and whined as if in pain. Death followed in about eleven hours from the commencement.

Autopsy.—The peritoneum was extensively, but not deeply inflamed, the blush was most conspicuous where the syringe had been introduced, no doubt from the local irritation caused by the instrument.

This experiment may not at first appear to be conclusive, and to a considerable extent it is not satisfactory;—the difficulty being to draw a distinctive line between the mechanical influence and the physiological effects of the drug. My object, however, in this investigation was not to discover whether the ergot would occasion death when injected into the cavity of the peritoneum; but I wished to know how the animal system would be affected through such a medium. That the results did not depend upon simple mechanical irritation, I proved from a comparative experiment, which consisted in injecting into the peritoneal cavity of another dog, a strong solution of sound rye. No stupor, frothing at the mouth, or paralysis resulted. The animal appeared to suffer exquisite pain, and died on the following day, above thirty hours having intervened between the commencement of the experiment and its close. The peritoneum was much more extensively inflamed in this instance than in the former.

But I have injected strong solutions of ergot into the cavity of the pleura without any injury following it. The animals have generally survived the operation for two or three days, and the inflammatory state, ever apparent, has prevented my drawing any satisfactory inferences.

Its injection into the cellular tissue of animals, which experiment I have often tried, has invariably led to the formation of purulent matter; in some instances circumscribed within a cavity, bounded by parietes apparently formed of solid purulent matter, easily broken down, and feeling to the touch like soft cheese. In other instances it has been diffused throughout a great extent of tissue, burrowing amongst the neighbouring muscles, and forming a number of cavities, communicating finally with one common cyst.

The purulent matter thus formed has always been of a very offensive, and apparently unhealthy kind.

Section VI.—*Action of Ergot upon the Animal System, when given in large and single doses by the Stomach and Rectum.*

Expt. XIII.—An infusion of six drachms of ergot in four ounces of water, was evaporated to two-thirds, and then introduced by means of a gum-elastic catheter, into the stomach of a small terrier bitch, weighing ten pounds. In fifteen minutes after receiving it, she looked sickly, her eyes appeared heavy and red, and the contracted abdominal muscles, curved back, and prominent ribs, with an occasional hiccup, showed plainly the distress of the stomach and the prevalence of nausea. At this time the breathing was heavy and laborious, marked by an occasional deep inspiration, which was invariably accompanied with a shudder. At the end of twenty minutes, this tremor increased and prevailed during every inspiration, but none of the expirations were marked by it. In some instances it was considerably augmented, and nearly resembled convulsion, but this severity was only occasional. When twenty-five minutes had elapsed, she seemed inclined to doze, the eyes were heavy, and the conjunctiva reddened. When called, she raised her head, and looked very suppliantly, but refused to get upon her legs. In forty minutes she became very restless, whined much, and continually wandered about. No further symptoms of moment occurred until the lapse of three hours, when her hind-legs appeared to be remarkably weak. She moved them with difficulty, dragging them after her, and, in turning abruptly, generally fell. The fore-legs participated in the affection but not so strikingly; nevertheless they appeared numbed, and she threw them carelessly about, as though unconscious of their touching the ground. This condition subsided in about nine hours, up to which time she had refused her food, On the following day, she displayed nothing peculiar, except debility, considerable thirst, and a disinclination to eat.

Expt. XIV.—In two days afterwards, I gave to the same dog a similar quantity of ergot prepared as before. Nothing remarkable occurred until the expiration of half an hour, when she looked wild and confused, displaying occasionally strong indications of cerebral excitement. The tremor upon inspiration, and the faltering step, characterized this, as they marked the previous experiment. At the end of an hour she seemed to labour under great nervous excitement, for the least noise caused her to start in fear. She evinced also great irritability, for when a dog, with which she had played, immediately before the administration of the drug, came near to her, she growled or snapped at him, being evidently annoyed by his presence. At the end of six hours these symptoms had subsided, but during that period she refused to eat, and passed urine copiously seven times. For three or four days subsequently, she remained listless and inactive, sleeping much and eating very sparingly.

Expt. XV.—Five drachms of ergot, reduced to a very fine powder, were infused in water, and the whole of it, without straining, was injected into the stomach of a terrier dog, weighing thirteen pounds. He appeared in a very few minutes to suffer uneasiness, his belly was drawn up, and he crouched as though in pain. In eight minutes after taking it he began to vomit, and continued to be distressingly agitated with nausea and retching for nearly a quarter of an hour, when these symptoms declined, and gave place to severe and protracted hiccup; this continued for above half an hour, when he fell asleep, and subsequently awoke, apparently little affected by the medicine.

Expt. XVI.—Twelve drachms of ergot, reduced to a very fine powder, were suspended in water, and then injected into the stomach of a mongrel dog, weighing twelve pounds. Immediately after its introduction the gullet was tied, to prevent the ejection of the dose. In five minutes, he made many ineffectual attempts to vomit, though the sickness was not so great as I anticipated. It continued for six or seven minutes, and then subsided. In fourteen minutes general tremor came on, and the dog was scarcely able to stand. He stared wildly about, and seemed to recognize nothing distinctly. He then staggered into a corner, falling several times before reaching it, and in a few minutes began to doze. During sleep the limbs were twitched convulsively, the hind-legs were especially affected, and the abdominal muscles were in strong contraction. He snored loudly, and more than once I suspected a termination in coma. At the end of three hours he was somewhat easier, but hardly able to move. The eyes looked heavy, the conjunctiva reddened, and the mouth was filled with frothy saliva. The ligature was now relaxed, a further dose of twelve drachms of ergot was given, and the cord was tightened once more. This dose affected him much more than the former one, and in a few minutes after receiving it, he lay as if dying, moving his legs unconsciously in various directions. In a quarter of an hour he tried to vomit, and was evidently much agonized. He lay upon his side, occasionally fetching a deep sigh, and hiccupping severely; his look was remarkably wild, and the tremor upon inspiration excessive. After having been removed into a corner he fell asleep, snoring loudly, and frothing abundantly at the mouth. At the end of two hours and a half the ligature was removed, and the wound carefully sewed up. From the commencement he had passed no urine, but shortly after the removal of the cord, both urine and feces were evacuated involuntarily. In about six hours from the administration of the last dose, he ate three small pieces of bacon, and then refused whatever was offered to him. On the following day he was completely paralyzed in the hind-legs, and his command over the fore ones did not allow him even to crawl. He ate nothing during the day, but drank a good deal, and towards evening seemed to be a little relieved. On the second day he was able to stand, but when he attempted to walk he invariably fell, and was many minutes before he could rise again. He dozed almost continually, and was irritated by very trifling causes. His hearing now appeared to be nearly gone, for it required a great noise to startle him; his sight was also much diminished, and, indeed, I was several times of opinion that actual blindness had resulted. The sense of smell was totally lost, which was perhaps in some measure owing to the presence of an abundant and highly offensive mucus which poured from the nostrils. His victuals were obliged to be put into his mouth, for he could neither smell nor see them, and if left alone he must inevitably have been starved to death. Up to this day, I could discover no particular difference in the action of the heart, but it was now feeble and intermittent; the temperature of the body was much diminished, the nose perfectly dry, mouth parched, and in every particular he exhibited the most wretched picture of misery and suffering. On the third day profuse diarrhœa came on, after which the animal seemed a little better; his senses were more acute, and he was able to walk for a few yards. The wound in his neck discharged a matter of the most offensive description imaginable, such as rendered the stable, though a large one, almost intolerable.

From this time he slowly improved, but he never regained his flesh or recovered his liveliness. His activity was gone, his faculties were enfeebled, and he displayed every unequivocal proof of physical decrepitude and decline.

Expt. XVII.—Twenty-four drachms of ergot in fine powder were infused in five ounces of water, and when tepid the whole mass was injected through a gum-elastic tube into the stomach of a terrier bitch, weighing fifteen pounds, the gullet being tied immediately afterwards. In about seven minutes she began to evince signs of uneasiness, whining piteously, and drawing up her legs. In twelve minutes she made the first effort to vomit, and continued to do so with evident indications of suffering for above quarter of an hour, when these symptoms were succeeded by calmness and lassitude. During the greater part of the time in which vomiting prevailed, she was lying on her belly, and was therefore not disturbed; but on the cessation of the sickness, it was found that she was unable to rise, and on being lifted upon her legs, she maintained the position with difficulty, and in a few seconds fell. The pupil was contracted, the conjunctiva reddened, an abundance of saliva issued from the mouth, and the breathing was slightly stertorous. In eighteen minutes further, spasmodic twitchings of the hind-legs came on, the abdominal muscles next, and those of the fore-legs subsequently participating. During the prevalence of this spasm hiccup appeared, which lasted for a short time, and on its cessation, the animal began to whine and exhibit other indications of pain and torture. At this time, three-quarters of an hour from the commencement, the heart became intermittent in its beats, and its pulsations, at first rapid, were slow and feeble. Urine and feces were abundantly evacuated, and slight emprosthotonos appeared, with desire to vomit. At the expiration of an hour these symptoms subsided, leaving the animal weak, flaccid, and motionless. She continued to froth at the mouth, the pupil remained contracted, the eye fixed, and, except when touched, not influenced by passing circumstances. In two hours and three-quarters from the commencement, the ligature was removed from the gullet. The extremities were now growing cold, the spasms had subsided, and nothing but slight tremor upon inspiration was discoverable. Respiration was very slowly performed, and insensibility much diminished; for when pricked she manifested no uneasiness, and a deep incision was required ere its influence was acknowledged with a groan. At the end of five hours, nothing of further importance having transpired, she was left for the night, and on entering the stable on the following morning she was found to be dying. The pupils were dilated, the action of the heart could not be felt, the body was perfectly cold, and equally insensible, and the only proof of vitality remaining was an occasional gasp, which was accompanied with a drawing down of the lower jaw. In rather more than an hour and a half afterwards she died, having survived the experiment nineteen hours and forty minutes.

Autopsy.—The body was opened immediately after death, but the muscles were not susceptible of galvanic influence. The heart contained blood in all its cavities, but the blood of the left side was of too dark a hue to indicate perfect arterialization. The substance of this organ was soft and flaccid, and the *venæ cavæ* for some distance beyond it were gorged with blood. The lungs were darker than natural, the trachea was lined with frothy mucus, and the bronchial ramifications were, in some instances, filled with it. The gullet exhibited nothing remarkable, but the lining membrane of the stomach was extensively reddened from minute injection, the loaded vessels being more conspicuous upon the summit of the rugæ than in their intervals. Only a small quantity of ergot was present in this organ, the greater part having passed into the intestines. The vermicular motion of the latter had ceased, and they contained abundance of bile. Feces were found in the rectum, and the bladder was full of urine. The uterus was natural. Upon removing the skull, the *dura mater* discovered a slight and diffusive injection, but distinctly less than the *pia mater.* The substance of the brain was little altered, and the left ventricle only contained a small quantity of serum. The spinal chord was natural throughout. This experiment was witnessed by Mr Henry Taylor.

Expt. XVIII.—Nine drachms of finely powdered ergot were, after slight infusion in three ounces and a half of water, injected, *en masse*, into the stomach of a rabbit, weighing five pounds and a half. There was no necessity to tie the gullet, as this drug, like most others, fails to induce sickness in such animals. At the end of half an hour it began to show signs of uneasiness, constantly turning about, and drawing together its legs as though pained. In about ten minutes this restlessness had subsided, and when an hour and a half had elapsed, the rabbit began to dose, twitching a little at the same time, particularly in the hind-legs and ears. He was watched for two hours longer, and nothing particular appearing, I left him for the night, and on the following morning found him well and lively.

Expt. XIX.—Sixteen drachms of ergot were, in a manner similar to the last, introduced into the stomach of a female rabbit, weighing four pounds and three quarters. The dose appeared to occasion a little uneasiness, indicated by a very frequent and somewhat peculiar change of position; but none other symptom at all expressive of its influence could I discover until the termination of two hours and a quarter, when its fur was remarkably roughened, not having the softness of texture and uniformity of disposition characteristic of good health. This peculiarity of surface, unmarked, however, by any other symptom, continued until the following day, when its absence and a good appetite justified the inference that all indisposition had subsided.

Expt. XX.—Eleven drachms of ergot, after the customary infusion, were, without straining, injected into the rectum of a bull-terrier bitch, of about eighteen pounds weight. The enema was retained for twenty minutes, at the end of which time it was forcibly expelled with a small quantity of fecal matter, severe tenesmus succeeding. She then became uneasy, whined piteously, passed a little urine with apparent difficulty; the pupil dilating at first, and contracting subsequently. In a short time she foamed much at the mouth, twitchings were observed in the hind-legs, which in an hour afterwards were weakened and benumbed, their temperature, as also that of the body, being much reduced. On the following day she was quite well.

Expt. XXI.—Fifteen drachms of ergot were, in a manner similar to the last, given to a mongrel dog, weighing nine pounds and a half. The symptoms were almost identical with the preceding, except that he appeared to suffer considerably in passing urine, and in half an hour priapism came on, associated with hiccup. For two or three days this animal laboured under a dysenteric affection, and considerable weakness of the hind-legs.

From these experiments we may infer, that ergot is capable of exciting a local irritation upon the parts with which it comes into contact; determining when in the stomach nausea, vomiting, and hiccup; when in the rectum, tenesmus; and by sympathy, dysury and priapism.

Its influence upon the brain and spinal chord is well expressed, on the latter especially; but it is evident that a considerable dose is required for the developement of any active results.

It will also be observed that rabbits are much less influenced by the ergot than dogs; a circumstance perhaps attributable to two causes; 1*st*, vegetable diet being the one allotted to, and therefore best suiting them; and 2*dly*, because they are able to bear a much greater quantity of narcotics and other substances of that class than carnivorous animals; the influence of such medicines upon them being of course greatly modified by idiosyncrasy.

The next experiments are intended, according as they may apply, to confirm or render nugatory the long prevalent opinion in favour of the production of spasmodic ergotism and dry gangrene from the protracted use of ergot of rye.

(To be concluded in Next Number.)

ART. II.—*Case of Phlebitis, successfully treated.* By GEORGE BELL, M. D., &c.

PHLEBITIS is a disease over which local remedies have little control, and one whose general management does not appear to be accurately understood. Cases of successful treatment, therefore, are alike interesting and important, for it is from their multiplication alone, that correct principles can be deduced. In order to assist in the fulfilment of this object, we record the following history,

Richard Millar, aged 22, of spare habit, sallow complexion, and habitually temperate, was admitted into St Bartholomew's Hospital on the 18th of June 1836, labouring under œdematous erysipelas of the forearm, and simple integumental inflammation of the upper arm on the right side. His expression was anxious; the skin was hot and dry; the pulse frequent and full; the bowels were constipated; and, the other symptoms which usually attend fever, were observed.

He stated that, about ten days previous to his admission, he had been bled on account of a pain in his side, that on the following day he felt well, and returned to his work. The integument surrounding the wound made with the lancet became slightly inflamed and painful; but he continued at labour, heedless of the increasing pain and inflammation, until inclination and ability to be active had so diminished, that he was obliged to confine himself to the house. His symptoms gradually increased in severity, until the evening of the ninth day, when he presented himself at the hospital in the condition already described. He had not been subjected to any treatment.

Twenty-four leeches were applied to the upper arm; the limb was directed to be fomented; and a cathartic of calomel and the compound extract of colocynth was administered.

On the following day, the arm was less painful, but there was no abatement in the swelling, although the parts were less tense, and no improvement in the general symptoms. He now, for the first time, complained of pain shooting from the site of the wound towards the axilla; his intelligence was less acute, and his tongue was beginning to be incrusted at the edges. The basilic vein could be felt indurated nearly throughout its whole extent.

On the 20th, He was in the same state; the wound and the parts in the immediate vicinity were puffy, and obscure fluctuation could be felt. A small incision was made in the tumour, and about one drachm of purulent matter was evacuated. On introducing the probe, it was found that the instrument could pass in two directions only, viz. upwards and downwards, in the direction of the course of the vein, which led to the opinion that the matter had been evacuated from a venous abscess. This opinion was strengthened by the fact, that on gently pressing the vein from above downwards, an additional quantity of tinged purulent matter to the extent of two drachms escaped; and the vein, which previously felt hard and tense, had now become comparatively soft and pliant.

His pulse was still rapid, but compressible, and his bowels were inactive; the tongue foul; thirst moderate; and the skin dry but not parched.

A purgative enema was directed to be immediately administered; he was ordered to take every eighth hour a pill, consisting of two grains and a half of the chalk and mercury powder, and the same amount of Dover's powder, and to use the effervescing draught according to the symptoms.

21st, The constitutional symptoms were improved; the swelling and pain of the arm were abated; but he complained of pain below the short ribs on the left side, and acute pain in the left knee-joint. The pain of the side was relieved by pressure, but that of the knee was much aggravated by the slightest touch. The knee was fomented. From this time he gradually improved. In a few days the mouth was slightly affected by the mercury; the limb regained its normal condition, and the patient, as regards general symptoms, was convalescent. The vein was contracted to the size of a violin string. The alterative was omitted so soon as the mouth became affected, and some bitter infusion was prescribed.

On the 28th, he was quite convalescent, and discharged, with a recommendation to go to the country.

This case excited a good deal of interest at the time of its occurrence, and it is an important one in several respects. On the evening of admission it differed in no way from the common case of erysipelas with œdema, for the patient complained of nothing which could lead us to consider this lesion as secondary, either in importance or event. Our inquiries were directed towards the discovery of *phlebitis*, for considering the wound made by the lancet as the centre, starting point, or immediate cause of the erysipelas, we thought that it might give rise likewise to inflammation of the vein. This suspicion was not confirmed by aught seen or felt, for the redness and swelling of the upper arm effectually prevented any precise information being acquired by local examination. On the day succeeding that of his admission, matters were somewhat changed; there was pain distinctly referred to the course of the vein, the tenseness of the arm was diminished, and the indurated vein could be felt. Added to this, a tendency to typhoid fever was manifest. A question arose as to the propriety of continuing the antiphlogistic treatment. All the benefit to be expected from depletion or other depressing means had been already conferred, and we doubted the power of such measures, either to arrest or modify the progress of the local disease. Existing signs warranted this opinion, for the violence of the disease was abated, and the force of the constitution was declining; and the event of the following day confirmed it, for purulent matter had been already secreted, and was approaching the surface. We had to do, therefore with the constitution; we had to deal with the fever which had been awakened.

There is a peculiarity in the fever which attends this and some other local inflammations which cannot be accounted for, either on the tissue affected, or by the intensity of the inflammation. It differs from the fever which accompanies pneumonia, pleurisy, and other simple acute inflammations, which is purely symptomatic, and it is identical with that described by the late M. Broussais, as symptomatic of *gastro enteritis*, or inflammation of the glandular and follicular tissue of the bowels. It has the character of what, in this country, is denominated continued fever; it is little tolerant of depletive measures, and but slightly affected by treatment of the local affection. It is essentially an idiopathic fever, excited by a particular cause, of which cause it immediately becomes independent. We hazard no theory regarding the primary cause of fever, but, having referred to the doctrine of Broussais, shall merely express a doubt whether the fever he recognizes as symptomatic of existing intestinal inflammation, is not rather dependent on disease having existed, by which the general irritability of the system has been so far modified as to render it obnoxious to common causes. In a word, we think that the fever is purely idiopathic in its nature; that it occurs, not because the gastro-intestinal mucous membrane is depraved, but because it has been depraved; and that erysipelas, phlebitis, &c. are merely exciting causes, acting on a system predisposed to fever, and waiting an opportunity to exhibit its predisposition.

Having hinted at what we consider to be the nature and origin of fever, it may be expected that something should be said about the nature of the causes of which it is so commonly regarded as symptomatic. A man receives a wound, lacerated, contused, or simple; erysipelas occurs, a degree of fever accompanies it; he is bled, and phlebitis ensues. Little benefit is derived from the depletion; the fever speedily loses any signs of vigour it may have at first exhibited; and it assumes a typhoid type altogether identical with continued fever. This is a case which we have repeatedly witnessed. Here the man was predisposed to erysipelas; an acquired condition of the economy rendered him obnoxious to causes which, to the healthy, are sources of inconvenience rather than of danger. Anterior derangement was proved, by the changed irritability of the part in which the local disease appeared, and the constitution responded by a fever disproportioned in intensity to the exciting cause. Erysipelas is a local disease, recognizing a constitutional origin, and the fever excited by it is idiopathic in essence, originates from the same cause, and is born to immediate independence.

Reversing the order of events, local inflammation frequently arises during the progress of continued fever, and although the fever is its exciting cause, it is primarily dependent on the same anterior vicious working in the system which gave origin to the fever. The occurrence of inflammation in one tissue or organ rather than in another, can only be explained by the doctrine of peculiarsusceptibilities. Inflammations occurring in this way are denominated spontaneous, by which term we understand that they arise independently of any influences external to the animal body. If this definition be correct, it implies some anterior change in the diseased capillaries, else when the same stimulus is circulating through the system, why does not general instead of local inflammation arise? It may or it may not be true, that fever is another name for general inflammation; but the question still returns, why in addition have we another and a distinct inflammation? One year a large proportion of the inhabitants of this town were affected with bilious diarrhœa; another year few escaped the depression of influenza; during a third year many above the average suffered the pains of rheumatism; and every year hundreds are seized with continued fever, to which is superadded a local inflammation, termed a complication, and occurring like an epidemic. Some peculiarity in the causes of the epidemic seems to determine the nature of the complication. The constitution has previously been so modified as to render one organ rather than another susceptible of generally acting causes. What may be affected through such a diluted imperceptible agent as these may be produced by the stronger and more sensible operation of unnatural, vicious, or civilized regimen, moral as well as physical. This seems to be the remote cause at once of the local disease and the fever it awakens, and as both are constitutional in origin, our remedies should be chiefly applied through the medium of the constitution. Experience shows, that topical remedies have little effect on the local evidences of constitutional ailment, and still less on the fever which the local disease kindles.

Erysipelas may be the exciting cause of phlebitis. A middle-aged man, of dissipated habits, received a wound on the hand; erysipelas ensued, which gradually extended up the arm to the body, so as to involve the shoulder and side of the chest. He died. On dissection it was found that the subcutaneous cellular tissue of the upper arm was affected, the limb was œdematous, the texture immediately surrounding the vein was infiltrated with purulent matter, the coats of the vein were thickened, the ***vasa vasorum*** were distinct, and the canal of the vessel was filled with purulent matter. We have reason to believe likewise that phlebitis is sometimes the result of burns. We have more than once made minute examination of the veins of subjects brought to the dissecting-room with marks of recent injury from fire. In these cases it was found that the plexus of veins at the bend of the arm, together with the main trunks, were effected in the manner above described. In addition to this there are other reasons for believing that burns sometimes prove fatal by inducing phlebitis. We have observed that burns by which the vitality of the skin is immediately destroyed, are, *cæteris paribus*, less fatal than those which excite such a degree of inflammation, as despite treatment, to advance to mortification or sloughing of that texture. The general symptoms in such cases are similar to those observed in phlebitis; the fever is seldom of a character which demands decided antiphlogistic measures, but, on the contrary, is of such a nature as to require our being on the watch for the time when stimuli are necessary.

We have seen several cases in which the injury was confined to the upper part of the arm, and in which a fever, speedily assuming a typhoid type, set in, and carried off the patient. In comparing such cases with others, in which the vitality of the skin was destroyed by fire, and the patients recovered, we are inclined to believe that the constitutional symptoms were not, in the first class of cases, dependent solely on the integumental inflammation, but that some other local inflammation had arisen which determined the fatal event. The extent of the injury in the cases referred to, would not account for so serious a result. One fact, mentioned in the history of Millar's case, enables us to ask whether the practice of re-opening the wound in the vein, with the view to discover and evacuate purulent matter, might not with advantage become more general. We cannot see that it involves risk; and it is reasonable to expect that it might frequently be productive of positive good.

With regard to the treatment of *phlebitis* in general, the practice pursued in the case of Millar seems to be worthy of imitation. It was adopted in his case, because we had frequently seen it successful in cases of erysipelas in which the constitution was similarly disturbed. Local depletion cautiously employed, alteratives, gentle laxatives, and enemata, succeeded by nutrients and a moderate use of stimulants, are the means best calculated to relieve the constitutional suffering, and conduct our patient safely through his convalescence. We say that local depletion should be cautiously employed, because danger may, and often does arise from acting on the imagination, that, if it does no good it will do no harm, and we approve of alteratives, because we believe that the severity of the symptoms chiefly depends on a morbid condition of the intestinal and hepatic secretions, which can be most certainly remedied through their influence. We say this, not only because we have seen their beneficial effects in this case; but because we have witnessed their salutary operation in many cases of continued fever, evidently dependent on intestinal derangement; because we have observed their beneficial effects in cases of foul ulcers, and ill-conditioned wounds in which the general symptoms were similar to, though not so intense as those which accompany *phlebitis;* and because we have found them to be valuable agents in many cases where long-continued bad health was clearly referable to a depraved condition of the gastro-intestinal mucous membrane, as indicated by the tongue, skin, eye, temper, and the mental and corporal activity of the person. This would be a fitting place to enlarge on sympathy with a view to explain all this. We might talk at length and much more mysteriously about the sympathy which exists between the stomach and other parts of the system. We might quote the numerous propositions of authors, criticise their logic, and express wonder at their powers of supposition. We might consider their data, modify their reasoning, and draw new, perhaps opposite conclusions; but in so doing we should be aiding and abetting in mystifying what has been already sufficiently obscured. Thus, although a fresh hypothesis might be invented, and words explanatory thereof traced, still no one would be benefited thereby; for it is absurd to speculate on conceptions of whose genuineness we have no certain tests. Too much caution cannot be observed in the application of the inductive method of reasoning to the solution of questions connected with a purely practical science.

In the cases alluded to, we dread the active employment of cathartics, unless the bowels are distended with feculent matter, and a necessity evidently exists for their immediate evacuation. In such instances we should employ purgatives with a view merely to unload the bowels, and not with that perseverance which implies a belief in their power to remedy the lesion which determined the lodgement. We here desire that our opinion be not regarded as opposed to the doctrine so ably propounded by the late Dr Hamilton, whose name is so closely and justly associated with the principle of employing laxatives without purging. Dr Hamilton refers to cases in which it is evident that the symptoms are owing to abdominal irritation produced by the accumulation of feculent matter; and not to cases where they are dependent on a depraved state of the gastro-intestinal mucous membrane, of which the lodgement of feces is not the most serious effect, or that to which the physician should primarily and principally direct his attention. We employ purgatives in such cases merely to unload the intestines, to remove accumulated secretions, and not with any intention to remedy the lesion which exists, which is more certainly rectified by the judicious employment of mercurial alteratives.

We have frequently observed the co-existence of erysipelas, phlebitis, and other local morbid states, with abdominal derangement; the latter having been known to exist prior to the former, or the fever which accompanies them, and, therefore, independent of both. The frequency of the coincidence awakens a belief in their connection; and the result of treatment directed towards remedying the abdominal lesion justifies the opinion, that that connection is relationship. We have spoken of alteratives as a class of remedies on whose power to rectify the abdominal derangement we place considerable reliance; and we are the more encouraged to do so, because we have generally observed that slight affection of the gums or fetor of the breath, and the commencement of a return towards health, are simultaneous events. Although not quite relevant to the subject, we may be allowed to remark, that, in the treatment of delirium tremens by calomel and opium, abatement of the symptoms has almost uniformly been coincident with the characteristic effects of the mercurial. This has been so much the case, that, to us, it appears a good fact on which to ground our prognosis, however slight the change may be. It is an evidence that the constitution is still susceptible of the influence of remedies.

Derangement of the biliary organ is frequently associated with the lesion of the stomach and bowels referred to. Whether it be affected primarily or secondarily, the result is the same; for once established, the two diseases react on each other, and the discord is kept up. Each lesion becomes a strong reason for the persistence of the other, and our object is to remove one, for thereby we shall more readily silence the other. We do not pretend to know the cause of the primary lesion, for it may or it may not depend on the causes to which it is commonly attributed; but of this we are assured, that the diseases may go on, though the primary cause has long ceased to operate, for two lesions exist; they are springs, and the pendulum which vibrates between them, striking alternately against each, is sent back with almost undiminished force. But vital strength will yield to continued calls for its exertion; by degrees this energy will diminish; by degrees this reciprocal action will fade; in time it will entirely cease, and the patient be a miserable dyspeptic. The two lesions are now quite independent of each other, and for their removal a doubtful and experimental and complicated treatment is required.

Art. III.—*On some States which resemble Inflammation.* By William Brown, F. R. S. E., Fellow of the Royal College of Surgeons. (Read before the Medico-Chirurgical Society, 1st May 1839.)

It is strange that, while the cultivators of medicine are so numerous, and their zeal and assiduity so thoroughly unwearied, it should still be a matter of question whether the art be now in a progressive state. The more general and perhaps the nearly unanimous opinion is, that medicine is advancing with a steady progress to perfection, but, meanwhile, a few names, not undistinguished in science, maintain that there is no real progress, or only progression in the circumference of a circle, that is, constant motion, but, at the same time, constant return to the position formerly occupied. Dr Francis Home, in his Treatise on Croup, published in 1765, observes that " the science of medicine has been gradually advancing for the 2000 years bypast, and is now brought to a great degree of improvement, perhaps to as great, every circumstance considered, as the difficulty of the art, the limitation of the human faculties, and the continual attempts to further refinement, too often conducted merely by fancy, will admit of." We smile at the boast of Dr Home, and think of the improvements and discoveries since his day; but we are as ready to plume ourselves as he was on the existing state of medicine, and we find nearly his own expressions made use of by writers of the present period. But what are the real facts of the case? Is medicine truly progressive, or is it stationary?

When we think of medical hypotheses, we may very readily adopt the latter opinion. We observe now the same restless search after first principles, and the same disposition to gather these from a few observations, which characterized the more ancient physicians; and even the younger members of the society will recollect opinions started by their zealous inventors as irrefragably certain, which a very few years have first undermined and then demolished. With regard to new diseases, do we not find hints of almost every one in the older authors, and do not the critics of the present day often detect in this way the plagiarism of modern discoverers? If we turn our attention to remedies, we find much to discourage our boastings. Disease appears to be as rife as it was in former days, and our vaunted improvements in the materia medica have not made death less frequent than before, have not added to the average duration of human existence. Increased longevity has not yet been attained, and if there be any diminution in the rate of mortality, it is attributable not to the increased power of medicine, but to those happy arrangements of modern civilized society which have prevented the frequent occurrence of famine and of its usual attendant, pestilence, which have provided for the more perfect clothing of our people, and the greater cleanliness of their dwellings. Chemistry has, indeed, done her best in analyzing and combining various medicinal agents, and every now and then some bright idea, some splendid panacea has been elicited from the laboratory like a spark from its furnace; but the *currus triumphalis* of the one has been scarcely more lengthened than the blaze of the other. Whether we inquire as to the discovery of what was before unknown, or as to the actual power which medicine now possesses in controlling disease and adding to human happiness, as compared with that of other times, we are hurried into conclusions which tend to nearly universal scepticism.

And yet there must be some fallacy in this reasoning, for our knowledge of the animal structure and of the bodily functions has received large accessions. If we are not better acquainted with the proximate causes of diseases, we are at least much better acquainted with their effects, from the study of morbid anatomy. We possess all the remedies which were known to the ancients, and many new ones of great power have been discovered by the researches of modern observers. The possession of knowledge does, to a certain extent, imply the possession of power: and hence we must necessarily have more power in the cure of disease.

But while it is undeniable that our science has made advances in modern times, yet it appears to me that the principal improvement which has taken place is, that a greater number of practitioners are now masters of the existing knowledge, and hence that a greater number of practitioners are, not discoverers, but intelligent and industrious appliers of the discovered truths, both as to diseases and their remedies. I infer this from the increased means of instruction possessed by the profession, both in the schools and by the extended diffusion of medical literature. Formerly knowledge was more difficult of access, and only the men of original genius or of unusual assiduity could acquire much of it; but it is now open to men of more ordinary minds and of more commonplace habits.

We must never forget, however, a circumstance which influences all our opinions on this matter; I mean that each practitioner is himself in a state of progression. If he be a man of even common observation, every day is adding to his stock of knowledge; not only to that which is derived from books, but to that more precious knowledge which is gathered from experience, which each man learns for himself, and which no man can communicate to another. It is this which is daily changing, and at least revolutionizing the mind of each practitioner, and by virtue of which he differs more from what he was twenty years ago than he does from the practitioner of the bypast century.

There can be no doubt that the difference between the more experienced physician or surgeon and others consists mainly in the correctness of his diagnosis. The application of the remedy to the ascertained disease is comparatively the easier process. It requires, indeed, no great skill to determine that one patient is afflicted with dropsy, that another has palsy, that a third is affected with fever, that a fourth suffers from dyspepsia. But what organic lesion has given rise to the watery swelling, what is the state of the brain indicated by the palsy, how the vital organs are affected in the individual case of fever, whether the dyspepsia be functional merely or organic,—these are questions which, to be answered correctly, call for the enlightened skill of the most accomplished practitioner. Upon the diagnosis will the treatment depend, and that treatment will influence the life, or at least to a great extent, the well-being of the patient. The disease itself may have been ascertained, but the stage at which it has now arrived requires also to be determined: for the treatment which was appropriate at one period may be inert or detrimental in the subsequent progress of the case.

A considerable number of diseases are inflammatory, or at least consist of that congestion of the vessels which frequently passes into the state of inflammation. If we reckon up the various tissues of the body, and recollect that every one of them is susceptible of inflammation, acute, subacute, or chronic, the number of cases occurring in a climate such as ours cannot be matter of wonder. To take only one example. The lungs comprise at least three tissues, the investing membrane, the lining membrane, and the parenchyma intervening. Each of these is liable to inflammation, and hence we have pleuritis, bronchitis, pneumonia. But each of these forms of disease is modified as to activity and duration, besides the peculiar constitution which each individual possesses; and each of these modifications demands its appropriate mode of treatment.

When inflammation occupies any of the external parts of the body, its presence is characterized by the signs of redness, pain, heat, swelling. These are present to a greater or less degree, in every example, and their conjoint existence is necessary to constitute inflammation. When one of the internal organs is affected, as we have no opportunity of using the senses of sight and touch, we infer the existence of inflammation from pain in the affected part, disorder in its function, and the febrile state. These, however, are not infallible signs of inflammation. There are many circumstances which mask the real nature of the disease, and lead away the attention from it to some of its consequences, or to some accidental symptoms which are connected with it. Again, there are various affections which simulate inflammation, assuming some of its characters, and thus leading to a treatment that is inappropriate. Some of these are more important than others, but in every one of them a correct diagnosis insures a correct treatment. It is my wish to call the attention of the society to some examples of this, and although I have nothing to communicate which is not already known to many of its members, yet the frequency with which errors are committed regarding it, (many of which have been committed by myself,) leads me to believe that the attempt will not be uninstructive.

1. The most obvious example of a diseased state resembling inflammation, and yet calling for a very different treatment, is *chilblain ;* and I mention it first, because it is so obvious, and because there is no difference of opinion among surgeons about it. It is always attended by redness, swelling, a tingling pain, and the sensation of heat, even though there is no actual increase of temperature. So far it resembles cutaneous inflammation, but it is never treated as such ; and we all know that to detract blood from the part, or to apply the warmth and moisture of an ordinary poultice, would be likely to produce sloughing or unhealthy ulceration. It is treated by stimulants and anodyne applications, and these are found beneficial not only in the primary affection, but in the ulceration which so often succeeds.—In cold weather we often observe an approach to the state of chilblain in the purple-coloured hands and feet of children and invalids. Insane patients are especially liable to it; indeed, with them and many others it is observed in weather when no real chilblains are to be met with. In scrofulous children, in young females with imperfect menstruation, in old victims of intemperance, the purple countenance, hands, and feet, are of common occurrence, and all mark a languor in the capillary circulation which is to be removed, not by local or general depletion, but by the judicious use of a stimulant and nutritive diet. This purple colour of the surface is sometimes designated as a florid complexion ; but it is essentially different from a natural bloom, or from healthy plethora (if such a term be admissible,) and generally indicates a state of the body in which great depletion is not well borne.—There may seem to be no great connection between chilblain and erysipelas ; but it will be convenient to place under this head some remarks on the latter disease. Many cases of erysipelas are examples of genuine inflammation, having all the characteristics of that state, and passing regularly through its various consequences of effusion, suppuration or gangrene. But there are other cases which in their origin, progress, and termination, are altogether different. They often proceed from mere gastric irritation, (as urticaria usually does,) and are removed as

rapidly as they first appeared, by remedies directed to the digestive organs. The tendency of erysipelas to migrate from one part of the surface to another, or suddenly to be translated to an internal organ, leaving the first seat of attack entirely free from disease, marks it out as somewhat different from common inflammation. And, while energetic treatment is sometimes indispensable to preserve the limb or even the life of the patient, the very common (once the universal) practice of merely covering the affected part with dry flour, indicates very significantly that, in other cases, the do-nothing practice is quite sufficient. The truth is, that under the name of erysipelas we comprehend several affections different from each other, and it is very desirable that they should be distinguished more correctly than they are.

2. *Chronic Rheumatism* has no claim to be called an inflammation, and is rather a consequence of that state; but it consists of severe pain, and the affected joints are always more or less swelled. It is a very intractable affection, often tiring out the patience of the practitioner, and affording a favourable opportunity for the empiric. Leeching has sometimes been tried, but seldom with any benefit, and the treatment which is most approved consists in counter-irritants, alteratives, the warm bath, and the assiduous application of the hand-cure by shampooing. Acute rheumatism is generally treated in part by blood-letting; but the rule laid down by authors as to the treatment of internal inflammation, viz. that we are to bleed so long as the buffy coat appears on the blood drawn, is quite inapplicable to his disease. This appearance is shown after every bleeding, and is not less characteristic even when the patient is exhausted to an extreme degree. This circumstance marks out rheumatism as differing from other inflammations; and the capricious nature of its movements, deserting one joint, which it leaves free from uneasiness, and attacking another which had previously been so; and then suddenly leaving all the external parts to attack the pericardium, would lead us to hesitate before we adopt the rule of bleeding for effect.

3. *Pleurodyne* is an affection of the muscles covering the sides of the thorax, or of the intercostals. It consists in severe pain increased on inspiration. It is sometimes a mere sprain of those muscles produced by some unusual effort, but often it is the result of cold, is attended with catarrh, and hence there is more difficulty in distinguishing it from pleurisy. The chief means of doing so are that in pleurodyne the pain is more severe, is increased by muscular exertion, and usually abated by pressure, while in pleurisy there is a quickened pulse and other symptoms of febrile action. In pleurodyne the relief afforded by the pressure of the hand, or the support of a bandage or plaster, is astonishing. Some eminent men have considered the state of the pulse as the

best index of the real nature of the case. The second Monro was in the habit of remarking, that whenever he found inward pain along with a quick pulse, he always found blood-letting advantageous. It is certainly a valuable guide, and I lately attended a case which I considered a muscular affection, and treated accordingly; but where the quick pulse suggested another opinion, and the decided relief which followed a full bleeding, rather showed that that opinion was correct. It is possible that in that case the pleurodyne did exist, but speedily passed into the pleuritis. The popular opinion, that the lancet affords the appropriate remedy for every "stitch in the side," is so very strong, that it is difficult to refuse the patient's request. No great evil follows the practice when the patient is a stout labouring man; but when a delicate female is the sufferer, she may be materially injured by a full bleeding, and hence it is wise to insist on the more suitable remedies.

4. *Rheumatism of the Abdominal Muscles* often resembles inflammation of the peritoneum, and the diagnosis is of great importance. There is in both tenderness to pressure, (the absence of which characterizes colic;) there is great difficulty of moving, either turning in bed or rising up to the sitting posture; there is often nausea and vomiting, and the grinding uneasiness among the intestines, showing that their functions are in disorder; and there may be constipation tending further to confuse the practitioner. In such a case the diagnosis will be derived mainly from the pulse. In peritonitis the pulse is always accelerated; sometimes it is more wiry in its beat, sometimes more thready; but in the muscular affection the pulse is not necessarily quickened, and when the patient has been quiet for a little while, not disturbed by motion or agitated by alarm as to danger, it will be found nearly natural. Pressure, too, may furnish some assistance to the diagnosis, because while a light pressure may, as in peritonitis, cause severe pain, on the continuance of the pressure, the pain does not increase as it invariably does in that disease, but rather becomes more tolerable, and to such an extent as even to invite its repetition.

Perhaps the very state of mind of the patient may offer a useful hint to the practitioner. It is well known that in peritoneal inflammation there is always severe suffering, but there is frequently a degree of mental calmness which continues even through the whole course of the disease; on the other hand, in many of the cases referred to as simulating that disease, there is hurry, anxiety, impatience, indicative of the nervous or hysterical temperament. That true inflammation may coexist with the hysterical state is undeniable; but in a large number of cases of this kind, the presence of pain will mark, not the genuine, but the simulated disease.

5. *Headach* arising from a disordered stomach is well known to every one. Every one has either felt or observed the acute pain which follows repletion from the ordinary viands of a dinner table, or excess in vinous liquors. But no one could suggest blood-letting as the remedy, although the local pain, the quick pulse, the disordered functions of every part of the system would at first seem to call for its employment. Experience shows us that an emetic, a purgative, a stimulant of another kind, sometimes mere abstinence from food, restores the healthy state of the stomach, and removes all the unpleasant sensations from the head.

Probably there are other cases of pain in the head originating in the same cause, (disordered digestion,) which we are too apt to view as inflammatory in their nature, and as calling for the detraction of blood. The pain in hemicrania, fixed as a nail in one spot of the head, and usually intermittent in its character, is such an instance. It is generally a symptom of deranged digestion, and calls for regulated diet, purgatives, and quinine. It does not call for blood-letting, and although it is sometimes relieved by loss of blood, this is no proof of its being the best treatment. Yet cases do occur not unfrequently in which the severity of the pain, and the immediate relief afforded by leeches, draw away the attention both of the practitioner and patient from the real seat of disease, the stomach and bowels. The perfect recovery which occurs in such cases is to be ascribed more to the native vigour of the system, enabling it to bear with impunity an injury inflicted, or rather to the regulated diet and medicinal remedies which are intended to be used as auxiliaries, but which are in effect the principal agents in the cure.

In cases of this kind there is no imminent danger to life, and, of course, the error in treatment is not seriously prejudicial; but in *delirium tremens* and in mania, the hazard is much greater. In the former affection pain is not a constant symptom, but it is a frequent one, and whenever the patient's attention is diverted for a little from his imaginary cause of alarm, uneasy sensations in his head are invariably referred to. I need not say that, notwithstanding such symptoms, blood-letting is not the approved remedy; and that while there are cases in which it is borne without injury, in which perhaps its employment is demanded, in a large majority of instances, remedies of a very different character are found most beneficial. Narcotic stimulants, counter-irritants, and purgatives are used with the best effects; whereas blood-letting has not unfrequently retarded the recovery, or even hurried on a fatal termination. There is reason to believe that in some cases of suicide, committed under the influence of the alarm or depression attending *delirium tremens*, the hemorrhage has proved fatal, although it had proceeded to only a moderate extent.

There are cases of mania to which the same remarks are applicable. Cerebral excitement and vascular turgescence are present to a considerable degree ; there are urgent and alarming symptoms, but there is no real inflammation, and blood-letting is not the appropriate remedy. It requires some fortitude to withhold the lancet in these cases, but the practitioner is well rewarded for his forbearance, by finding a more rapid and more complete recovery. I have no intention to proscribe blood-letting in all cases of mania; but cases such as I have referred to are of pretty frequent ocurrence.

6. But perhaps the *Epidemic Influenza* offers the most striking illustration of the principle which I am insisting on. Ample records have been preserved of this curious disease as it appeared in 1782 and 1803. Since that time we have all had opportunities of observing it in 1833 and 1837. It was a febrile disease with severe local symptoms, lasting for three days, and terminating by profuse perspiration. This description applied not to all but certainly to nine-tenths of the cases observed in Edinburgh. The commencing febrile symptoms were so violent that they seemed to mark an attack of continued fever. The local symptoms, which were most severe on the second day, and which were usually referable to the organs of respiration, seemed to indicate an alarming inflammation of some one of these. They would have called for bleeding under any other circumstances ; but bleeding was scarcely ever had recourse to, and when it was employed, it was not so much for the original disease, as for a modification or sequela of it. With a quick and hard pulse, a hot and dry skin, severe headach and constant cough, nothing would have justified the neglect of blood-letting, but the certainty that it was influenza, and not real bronchitis or pneumonia, and that in a few hours it would pass off under other remedies.

7. *Continued Fever* is perhaps the most important, as being the most extensively fatal of all diseases. I am desirous of making the preceding remarks on other diseases, bear upon it ; but the notice at present must be very short. When we consider that a large proportion of recoveries take place without leaving any morbid sequelæ behind, and that in many of the fatal cases, no disorganization of structure can be detected, it is highly probable that fever differs from inflammation in its pathology. Inflammation leads to morbid degeneration in a large number of cases, and these become apparent, whether recovery takes place, or the termination be fatal. Now, inflammatory symptoms are present in almost every case of fever. Some one organ is peculiarly affected with pain and disturbance of its functions. The symptoms call for watchful

anxiety on the part of the medical attendant, but they do not follow the course taken by idiopathic inflammation, and they yield to remedies of no great efficacy, or, at least, to a much smaller loss of blood than such an inflammation would demand. No one would leave pneumonia to the measures which are unhesitatingly had recourse to in the local affection of fever; and hence, we must infer that the two diseases are different in their nature.

I have now mentioned several forms of disease (and additional examples will perhaps suggest themselves to other members), in which there are symptoms resembling those of inflammation, but which a careful observer will be able to distinguish from them. They indicate, indeed, a different disease or stage of disease; sometimes a merely congested state of the blood-vessels, which may easily pass into inflammation; sometimes a state which is rather a consequence of inflammation; sometimes a local affection entirely *sui generis*; sometimes a congeries of local symptoms not arising from local disease, but symptomatic of disease in a remote part of the body. The resemblance to inflammation is sometimes so great as to perplex and agitate a young practitioner; and the importance of a right diagnosis is so much the greater, because the treatment appropriate to inflammation is prejudicial here. The eagerness with which we bleed in all cases supposed to be inflammatory, the anxiety with which this remedy is even called for by the patients, makes it the more necessary that we should commit no mistake. True it is that the ruddy complexions and robust constitutions of many of the patients, assure us that they will get no harm from the loss of blood, and that possibly it may do them good, at any rate. But these, I think, are only a small portion of the patients who apply to us under such circumstances. A large number are females of irritable and hysterical habits, men whose powers have been debilitated by a course of intemperate indulgence, or half-nourished children of the poor, whose strength is deficient, instead of superabundant. To abstract blood, in any considerable extent, from such patients, will incur the risk not only of allowing the present illness to continue unsubdued, but of leading to organic disease, of bringing on confirmed mania, and even causing premature death.

I am quite aware that the converse of this statement is equally true. Real inflammation is frequently subacute in its attack and insidious in its progress, so that the practitioner is thrown off his guard, and allows the disease to produce irremediable mischief. Many such cases there are, where organic disease has been mistaken for mere functional derangement; where subacute inflammation of the cerebral membranes has been allowed to proceed unchecked to fatal effusion; where pneumonia has been imperfectly recognized, and therefore, imperfectly treated; where peritonitis has been mistaken for colic. But these examples are just proofs of the necessity of careful observation on the part of the practitioner, and show not only how much caution must be exerted but how much alertness should be manifested with regard to every case which is placed under his care. The routine treatment which is so frequent in the profession, and which the indolence of advancing years is so apt to produce, is generally the consequence of an imperfect education, and of misimprovement of the advantages possessed in youth. The best safeguard is for a young man early to acquire habits of careful observation, of taking nothing for granted, and of seeing every thing with his own eyes; and while he pays a due regard to the experience, and even to the opinions of his seniors, to observe for himself and to think for himself; above all, to allow no symptom to pass by unheeded, and to ascertain, so far as he can do, the effect of every remedy which he employs on his patient.

Art. IV.—*Clinical Remarks on some Cases of Liver Abscess presenting externally.* By John G. Malcolmson, M.D., Surgeon H.E.I.C.S., Fellow of the Royal Asiatic Society, and the Geological Society, London.

There are few subjects less understood, and regarding which more incorrect notions are entertained, than the history and treatment of abscesses in the liver. With the exception of Mr William Geddes's admirable paper in the sixth volume of the Transactions of the Medical and Physical Society of Calcutta, and of some excellent cases to be found in other works, I know of no publication in which a philosophical examination of the subject is attempted; or in which the published information at all corresponds to that of our countrymen, who have had sufficient experience to form a judgment for themselves of the progress and proper mode of treatment. How erroneous would the diagnosis be, of one, who would take his opinions from Baron Larrey, and see no risk except from delay in plunging his knife into the sac;* or from the proportion of successful cases scattered through journals and transactions, the unsuccessful ones too often remaining unpublished. How vague and unfounded are the reasons given for early operation, or for delaying the measure; and how certainly destructive the treatment recommended and practised, of pushing the internal and external use of mercury, under the idea that the absorbents are in a state of such death-like torpor as not to admit the drug into the system;* and that if it can by any means be introduced, it will either remove the disease of the surrounding parts, or cause the absorption of the matter; and how few young or old practitioners will have the resolution to adopt what is styled "a tardy, irresolute practice, pregnant with mischief," in withholding the supposed specific or antidote, even when satisfied in their own minds that it can do no good. To such indiscriminate and erroneous rules we are to ascribe the still more injurious extreme of discarding the most valuable of all internal remedies in liver disease; and how painful must the feelings of the young practitioner be, who, taking up the work of so eminent an author as Dr Abercrombie, finds the employment of mercury in hepatitis mentioned with hesitation and distrust, and how vacillating his practice, while he yields alternately to the discordant testimony of authors of such reputation.

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* He gives one case of fatal termination ascribed to the neglect of the surgeon to operate early, as a contrast to 10 or 12 cases of success, in which his fearless mode of proceeding was adopted.—Memoirs of the Campaign in Egypt.

It is not, however, that these questions admit of no decision, but that the opinions of most authors on diseases of warm climates are hazarded without due investigation, and stated in general terms from vague recollection of unrecorded or very limited practice, and unaccompanied by the reasons on which they have been adopted. Indeed, many of these works, being intended as much for the perusal of the public as for the profession, hardly admitted of the necessary details, or of those sober and balanced statements necessary in such inquiries.

Entertaining such views of some works that have a great influence in directing the practice of medicine in India, it is not surprising that I should entertain the hope, that the careful record of many thousand cases of the principal diseases that have come under my observation during my residence in that country, should contain facts that may throw additional light on some of the many points on which conflicting opinions are entertained. Had other avocations permitted, I proposed to have submitted on the present occasion some account of these observations on inflammation of the liver, and on the states of disease leading to, or liable to be mistaken for "abscess in the liver;" but as the proper analysis of these documents would occupy several months, I must content myself with selecting for illustration, one or two points of pathology and practice, chosen rather from the accidental circumstance of their having lately occupied my attention, than from their superior importance.

1*st, Of certain circumstances necessary to be considered in Abscesses of the Liver pointing externally.*—Mr Cæsar Hawkins, surgeon to St George's Hospital, London, has published an elaborate paper of eighty pages, in the eighteenth volume of the

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* See Johnson on the Diseases of Tropical Climates, 3d edition, p. 175. O'Brien in Transactions of King's and Queen's College of Physicians, Vol. ii.

Transactions of the Royal Medico-Chirurgical Society, on what he styles "Sloughing Abscess connected with the Liver," in which the gangrenous ulceration of the integuments and other parts around the opening made into the abscess in two of his patients, is ascribed to the peculiar or malignant nature of the disease; and from this and other circumstances, he endeavours to establish the conclusion, that these cases were not examples of abscess of the liver, but of encysted tumours of the peritoneal coat. I have, however, found this gangrenous ulceration of the parietes of the abdomen to occur in several cases of common abscess in the substance of the liver, and believe it to depend on a cause quite unconnected with any thing peculiar in the internal disease, and that it becomes a serious obstacle to the recovery of many patients in whom ordinary abscesses of the liver are opened. These views are mentioned in a paper, which the same Society did me the honour to publish in the last volume of their Transactions. But although the symptom in question occurred in the remarkable case there narrated, it is not to be expected, that an opinion advocated by so experienced a surgeon as Mr Hawkins, and adopted in other publications, should be overthrown by an incidental remark in a paper devoted to other objects. I shall, therefore, take this opportunity to relate several cases in which gangrenous ulceration and sloughing of the edges of the wound occurred, and in which dissection showed the disease to be ordinary abscess in the liver; and as they are all possessed of other points of interest, I shall add some observations on other questions connected with their history and treatment.

Case I. *Nogpore, June 27th (vespere,)* 1827.—Robert Senior, corporal Horse Artillery, aged 30, nine years in India, arrived three days ago with a party of recruits, with whom he marched on foot from Hyderabad. Had two attacks of liver disease while on command, from the last of which he never perfectly recovered. Has been drinking since his return, and lay out, and his side is worse in consequence. Pain is confined to the angle of the right false ribs, shooting deeply through the side, and then leaves him for a short time. Can lie on either side, but is easiest when on the left. Has had a purgative, and twelve leeches are applied to the side.—He was directed to take at bed-time ten grains of calomel, and next morning one drachm of the compound jalap powder.

28th (vespere). Little relief from leeches. Has been freely purged by the medicine. There is a hard swelling below the angle of the right false ribs, and the cartilages bulge out; the tumefied part is tender to pressure, and he thinks that the skin is thickened over it; complains also of tightness round the hypochondrium. Pulse small and soft. Has occasional cold sweats at night. Has foul taste in the mouth, and the tongue is yellow at the root. Urine nearly natural.

A blister is applied to the side; and two grains of calomel, and half a grain of opium are ordered to be taken three times a day.

July 1st. Pain relieved by blister, but is still felt on full inspiration. No cold sweats. Passed several dark stools yesterday.—He was ordered to take one ounce of castor oil, and to continue the pills of calomel and opium.

3d. Had seven pretty natural stools on the 1st from the oil. Gums tender, and he spits a little. Had shooting pain in the side for two days, and yesterday evening began to be griped, and passed twelve scanty stools, composed of clear mucus of a yellow tinge, with griping, and has had no pain of side since. Pulse a little quick and sharp. —The pills were stopped. He was ordered one ounce of castor oil, with twenty minims of laudanum.

4th. Oil operates; stools thin, of greenish fæces, with a little mucus. No purging or griping since. Takes a full inspiration without pain, but swelling continues tender to the touch. Skin soft. He is ordered to take two grains of blue pill and two of ipecacuan four times a day, and to rub in camphorated mercurial ointment over the swelling.

11th. Has required to take laxatives occasionally, bowels being costive, and stools greenish-yellow, or of a dirty brown colour, and slimy. Pain occasionally shoots through the swelling and into the back, but is principally felt in the upper part of the tumour, and is worse to-day. Pulse small; mouth hardly affected.

Twelve leeches were ordered to be applied over the painful part; and to take three times daily a pill consisting of two grains of calomel, and one-sixth of a grain of tartarized antimony.

15th. Leeches relieved the pain a good deal, which afterwards shifted to the nipple, and on the side being fomented, again returned slightly to the angles of the ribs. The swelling continues very tender. Awakes very frequently in the night, without being able to assign any cause for it. Three green and slimy stools yesterday. Sweats a good deal at night, and his pulse is quick, small, and a little sharp. Gums tender, and he spits a little.

16th. Had frequent dark, dirty-green-coloured stools, with mucous streaks yesterday, with nausea, and uneasiness of the bowels, and great depression of spirits. The swelling more tender. The pills were omitted. He had an emollient enema, and at bed-time took a scruple of calomel, with two grains of opium, after which he slept soundly. His bowels are now easy, and he does not feel the pain of side when at rest.

He was directed to take immediately an ounce of castor oil, and at bed-time two grains of calomel and two of opium.

17th. Vomited part of the oil. Six yellow slimy feculent stools yesterday, but has had none since he had the pills. Swelling tender, and there is something like fluctuation perceptible. Foul taste in the mouth, and tongue is yellow at the root, the rest being red and smooth. Pulse quick, and a little sharp. Eyes clear, and without any tinge of yellow. Gets thin. The poultice to the hypochondriac region was continued; and the medicines were stopped.

20th. Uses the nitro-muriatic acid lotion, and takes wine with pudding to dinner, sulphuric acid with his drink, and an anodyne at night. Bowels regular. A dull pain in the tumour for several hours in the night, and it is rather larger and softer. The pain is usually confined to the most prominent part of the swelling, but occasionally shoots under the ribs nearly to the spine. No cough or pain of the shoulder; pulse quick and small; feels very weak, and can hardly walk to stool; vertigo; frequent cold sweats, especially after using drink.

21st. Yesterday had more pain in the swelling. The skin was hot, and the pulse quick, and rather sharp and full. Twelve leeches were applied to the circumference of the swelling, but gave no relief. A restless night. He lies on the back, turned a little to the right side, with the head bent in the same direction.

23d. A dull pain across the small of the back, and that of the side is confined to the softest part of the swelling. Bowels not open.

24th. Suffers much from pain in the swelling, in the hypochondriac region, and in the back, and can find no easy posture. Tumour softer, more tense, and the skin is a little red. Bowels not moved by an injection; and he can eat nothing. An incision is made on the most prominent part of the swelling, and twelve ounces of good purulent matter are evacuated; after which a tent is introduced, and eighty drops of laudanum are given him.

26th. Has been free from pain in the tumour since it was opened. On the evening of the 25th, the tent was withdrawn, and a poultice applied; much discharge from the abscess; sweats a good deal; no stool. Tongue brown at the root, and he eats very little. Pulse slower and more firm.

27th. Two brown stools from a purgative draught. Felt some pain at the extremity of the sternum since the operation, which has now left him, and he feels more comfortable. Considerable discharge, especially when at stool. * Has pains of back and limbs, ascribed to long confinement.

29th. Sleeps better; bowels pretty regular, but stools are brown. Takes his food well, is cheerful, and his countenance and strength are improved. Discharge rather less, and is free from fetor, but is mixed with some bloody-coloured purulent matter.

August 5th. Bowels require to be kept open by laxatives, and stools are still brown. Appetite good. The skin round the wound is inflamed, and the redness extends for some distance from the edges of the opening, which is sloughy. Has occasionally a little pain near the nipple, and some way below the wound, where the hardness of the swelling extends. Lies most easily on the left side. The poultice to be omitted, and the wound to be dressed with resinous ointment.

7th. Skin is sloughy for a greater distance round the wound, to which hot dressings are applied. Discharge not so copious, but of good appearance. There was a slight flush on his face last night. Pulse is of better strength.

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* See case by Dr Stokes—Diseases of the Chest, Vol. i. Section 6, Case 1.

12th. A good deal of discharge on getting up to stool. No flushes; sweats very little; tongue not brown; and pulse is of better strength. Bowels require to be kept open by enemas, and occasional laxatives.

14th. Discharge lessens. The slough has not increased; some sloughy matters have separated from the edges of the wound, and the opening is free. Sweats a little in the morning. Pulse quicker at the morning than at the evening visit. Had pains about the back and right hip last night.

16th. Feels stronger, and appears to gain flesh. Took an airing in a palanquin, and felt better. One consistent stool. Takes three glasses of port wine daily.

19th. Two large dark stools from medicine. The discharge while he lies on his back is scanty, and partly thin, and has a slight fœtor; on turning on his elbows and knees about half an ounce is evacuated. Does not sleep well; and pulse is rather smaller. Slough does not spread.

23d. Felt faint after going out in the palanquin on the 21st, but slept better. Sweats in the morning. Takes an egg to breakfast, but eats hardly any dinner. Vomited part of his tea this morning. A consistent pretty natural stool from medicine yesterday. Takes bitters with nitric acid, and the side is now poulticed. Beer substituted for wine. No change in the slough.

24th. A very bad night. Complains much of the weight of the poultice, and of great general uneasiness. On extending both thighs has pain about the wound. The gangrenous ulcerated surface round the opening nearly one inch and a half in diameter, and spreads by an eating ulceration of the skin, which is elevated, and surrounded by a slight margin of inflammation. The surface is covered with large hard granulations. The fleshy edges of the wound are in a state of slough. Some difficulty of swallowing. Takes only a little bread steeped in hot ale. Pulse soft, and easily compressed. Fainted at stool, and sweats much. Balsam of Peru is applied to the ulcerated surface, and a weak solution of tincture of myrrh is injected into the cavity of the abscess, which contains little more than an ounce and a half.

26th. Sinks. Little rest can be procured by opiate draughts. Passes his stools in bed. Urgent thirst, and drinks with difficulty.

27th. The draught has little effect. The abscess was washed out with warm water yesterday, as the matter was fœtid. Died at three P. M.

Sectio Cadaveris.—The abdominal parietes round the wound were completely gangrenous. The liver much enlarged, and strongly adherent to the peritoneum for some way beyond the margins of the ribs. The cavity of the abscess would contain little more than an ounce of fluid; its external surface was smooth; and the surrounding hepatic substance nearly natural. The liver extended quite into the left hypochondrium, and both lobes were studded with abscesses, some of them not larger than a nut. One in the centre of the left lobe, and another at the posterior margin of the right, were of considerable size.

The disease in this case seems to have run on to abscess and general enlargement of the liver, in consequence of great exposure during a march of 300 miles in the hottest season in one of the hottest districts of India,—soon after suffering from an attack of hepatitis; and is one of those melancholy examples constantly recurring, in which the physician's aid is only called for when it can be of little avail; and in which the doctrines advocated in most of our recent works on intertropical disease too often lead the young practitioner to the use of depletion, constant and severe purgation, large doses of calomel and other medicines, which destroy the strength of the patients, on the preservation of which all our hopes of recovery depend. This is no imaginary danger, as I have witnessed several cases, and have perused the histories of many more, in which copious bleeding and severe mercurial courses were persevered in, when all hope of their being useful ought to have been abandoned. At the same time, the military surgeon must be on his guard against the symptoms of depression approaching to collapse, feeble pulse, profuse sweats, &c. which so often follow debauch, being mistaken for the exhaustion consequent on the advanced stage of internal disease. In such cases he must content himself with the administration of a purgative, local bleeding, and the use of mild diet, while he at the same time watches anxiously the state of the patient on the cessation of the effects of intoxication, when the real nature of the original disease will become manifest, and may require energetic treatment.

It is remarkable, that a person in whom there is no reason to doubt that hepatic abscess had already formed, should have been able to perform laborious marches on foot during the most unfavourable season; and that, after the formation of adhesions and the approach of the matter to the surface, causing the protrusion of the false ribs, and the formation of a tumour in the epigastrium, the symptoms should be merely those of distension, and the local injury that of a collection of matter, without reference to the important organ in which it took place, or any great derangement in its functions. I have met with several remarkable examples of this, especially one in which a large abscess had made its way into the bronchi, and the contents of which had been expectorated before the patient experienced any inconvenience that prevented him from doing duty as a soldier; and, during the progress of the cure, it frequently happened that the patient felt himself well, and had the look of health while the abscess was refilling. Such cases are, however, more rare than we should be led to expect from the perusal of medical records, in which extraordinary cases form far too prominent a part; but they are not without their use, if they lead to the invariable rule of the minute examination of the abdomen in all forms of visceral disease,—a practice that can never be omitted without danger of the greatest errors. In this case, the sensations of the patient and the general symptoms gave no indication of the serious nature of the disease; nor was I at that time fully aware that a small, hard, defined swelling at the margin of the ribs succeeding hepatic symptoms is probably caused by abscess, as other disease of the liver almost invariably causes an uniform enlargement of one or more lobes of the viscus. Had I been aware of this I should not have prescribed mercury, which is always injurious when matter has formed; except in some rare cases in which a small abscess, in general encysted, and which has been long dormant in the substance of the liver, has produced inflammation of the surrounding parts, and of the existence of which we can never be certain during the life of the patient. Local bleeding may be required even when there is no doubt of abscess having formed, as the irritation it causes is constantly inducing renewed inflammation in the surrounding hepatic substance, or in the peritoneum or other viscera; and independent centres of inflammation are apt to produce other abscesses which, as in this case, may be the cause of the patient's death, when that presenting externally would have undergone a cure. Certain it is, that, in such cases, leeches and blisters often give great relief, which is not always temporary; and of the advantage of these remedies the poor sufferer is very sensible, and prays for their repetition. In this instance, however, they did no good, and the relief afforded by the blister was nothing more than what may have arisen from the patient's attention having been diverted from his internal sufferings. The employment of counter-irritant agents of any sort in the early stage of the treatment either of hepatitis or dysentery, I have long given up, as they conceal from the patient the internal pain, prevent the careful manual examination of the part, and interfere with the use of local bleeding, fomentations, &c.

The present case is one of those in which very extensive disease of both lobes of the liver did not produce any yellow tinge of the skin or eyes, and in which the biliary secretion of the liver was not interrupted, the stools being either dark-coloured, green, or yellow, the two last appearing from the detailed daily reports to be unconnected with the exhibition of mercury; nor was the secretion altered so much as often happens in slight and temporary functional derangements of the organ.* I have several times seen

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* This fact gives no countenance to the opinion of those who think that abscess in the substance of the liver arises from diseased action of the *vena portarum*; and that the production of healthy secretion is a certain indication of cure, and an effect of its production; the formation of bile and of pus being spoken of as opposed to each other.—See Johnson on Tropical Climates, &c. &c.

Mr C. Hawkins is of opinion, that "the rigors and perspirations" in hepatic abscess "are generally accompanied with more marked jaundice than in the aqueous encysted tumour, even when suppurating."—Med. Chir. Trans. Vol. xviii. p. 40. Yet in one of his cases of supposed encysted tumour, the skin was of a light yellow a free, and even copious and healthy secretion of bile, when great part of the viscus was destroyed by suppuration, the remaining portion of the gland appearing then to take on an increased action. In such examples, the hepatic aspect of the patient is wanting; and I have seen the existence of disease of the liver denied, in consequence of the natural colour of the excretions, an error which has, I fear, in some instances, led to neglect or injustice. This mistake was committed in the instance of hepatic abscess above noticed, in which the patient had coughed up a couple of pints of pus, and whose clear eye and healthy look even gave rise, in the minds of surgeons who had not watched its progress, to suspicion of the disease being feigned.

Pain at the nipple is a common symptom in deep-seated liver disease, even where the diaphragm and lung are unaffected; and to this cause it is to be ascribed in the present case, as it returned after the abscess was opened and had ceased to cause distension. Pain at the extremity of the sternum, or shooting under the ribs and across the back, are also to be looked for; nor is their shifting nature, nor the ease with which they are removed for a time, any proof that the disease is not of a serious nature. The rarer symptom of pain in the right hip may have been caused by irritation of the nerves, by the abscess in the posterior part of the right lobe; and such anomalous pains are never to be overlooked. They are occasionally felt in the right knee or foot, in both the lower limbs, in the nucha or back of the head; and depend on the same cause, as the more common symptoms of pain at the top of the shoulder, and the side of the neck, or of numbness of the upper two-thirds of the arm, or down to the middle of the fore-arm, which did not occur in this case, and are, indeed, often absent, or of very temporary duration. At one period the patient lay most easily on the left side, which is not uncommon when the left lobe is that principally diseased, or when it is enlarged and pressed on the diseased right side of the organ; in this instance, however, it is rather to be ascribed to the ribs being pushed against the diseased liver, by the weight of the body, when the patient attempted to lie on the right side. This the patient is often unable to endure, even when there is no abscess or adhesion, and it generally induces him to lie on his back a little turned to the right side; a position so characteristic of hepatic inflammation, that an observant practitioner may often detect its existence from this circumstance alone. The distension of the abscess and the adhesions, led to the bending of the head and limbs to the right side, which in the next case was so remarkable.

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colour; and in the following pages it will be seen that in many cases of suppuration in the substance of the liver, the skin was hardly or not at all tinged with bile. Saunders and other writers also lay far too much stress on this symptom.

Notwithstanding the fatal termination in this case, yet the appearances found on dissection are favourable to the proposal of opening abscesses of the liver as soon as we have reason to believe that adhesions are formed, as a cure would certainly have taken place had the abscess been solitary. The patient having gained strength and even flesh when numerous abscesses had already formed in the liver, is an important fact, that should be borne in mind in forming a diagnosis in severe cases of liver disease. During the first five days after the operation, the discharge continued to be good, and although on that day it was mixed with bloody-coloured purulent matter, it was again good on the twelfth day, which shows that the acrid, thin, and fetid discharge that afterwards came on, depended rather on the state of the constitution and on the nature of the action in the sides of the cavity itself, than on the admission of the external air. It is probable, however, that the discharge at an early period possessed irritating qualities, which, acting on the unsupported parts around the wound, long pressed on and much altered by the internal disease, at length produced inflammation, gangrenous ulceration, and sloughing, such as might be expected to occur when a part whose vital powers are weakened, suffers from local and constitutional irritation. To the same cause, and not to any thing peculiar in the original disease, is to be attributed the gangrene around the wound in Mr Hawkins's patients, which was evidently of the same nature. How frequent and distressing an occurrence it is, when hepatic abscesses are opened, will appear from this and the following cases.

Case II.—Jacob Burgess, three years in India, was admitted into the Horse Artillery Hospital at Nogpore, on the 23d June 1827, having marched from Hyderabad along with the last patient. Has enjoyed good health, with the exception of an attack of pain in the right side three months ago; and has had no complaint since, till within these two days, when he was affected with pain under the lowest right false ribs, extending to the muscles of the loin, and increased on pressure over the ribs, and on full inspiration. Had pain at the top of the right shoulder the first day. Pulse small and soft; tongue white, foul taste; bowels costive, and urine high-coloured. Had a purgative draught, and at bed-time ten grains of calomel. Eighteen leeches are applied to the side; and he is ordered a pill of three grains of calomel, and half a grain of tartrate of antimony three times a-day.

24th. Pain was greatly relieved by the leeches; he could lie on the left side, take a full inspiration, and, till nine last night, had no pain, except close to the spine. Pulse a little quickened, and rather sharp.—*Repetantur Hirudines* xviii. *Continuentur pilulæ cum Opii grano-dimidio.*

25th (vespere.) Much relief from leeches, but has still some pain on full inspiration. Pulse small and soft; gums get tender.—*Applicetur Emplast. Vesicatorium Hypochondrio.*

28th. Blister removed the pain. Tongue of a dark-yellow colour in centre; skin moist; sleeps ill; mouth ran a little yesterday.

29th. Had severe pain for three hours in the night, and it has not yet entirely left him. Cannot take a full inspiration. Pulse rather sharp; thirst; skin moist.—*Hirudines* xv. *parti dolenti.*

℞ *Calomel.* gr. v. *Pulv. Jalapæ* ʒi. *ft. pulvis statim sumendus.—Postea habeat ter in dies pilulam ex Calomel.* gr. iv. *Opii* grss.; *etiam infricetur unguenti Hydrargyri* ʒi. *ter in dies.*

30th. Vomited and purged by the jalap. Was relieved by the leeches for four hours, but pain returned in the afternoon, and extended to the back. A blister was applied, and he has had no pain since 2 A. M. Has been purged and griped in the night, and stools are mucous, grey-coloured and scanty.

Habeat Ol. Ricini ℥i. *cum Tinct. Opii* min. xx.—*Cont. pil. cum Opii* gr. i.

July 4th. Only one scanty light-coloured stool on the 30th from the oil. Had a laxative on the 2d. No pain. Skin is dry, and he has thirst, and some frequency of pulse. Gums white and a little sore, but hard, and he spits very little.—*Omitt. Medicamenta.*

9th (vespere.) Was griped and purged on the 6th. Oil gave relief, and he was free from complaint till yesterday morning, when he was seized with a sharp pain of the back and lower part of the left hypochondrium, increased and accompanied with a dragging sensation when he turned to the left side. Complains much of coldness of feet. Had ten grains of calomel and a grain and a half of opium, and used fomentations with some relief; and now has no pain when lying on the back, but on morning it returns as before. Three stools, the last scanty, and composed of white chalky feces and clear mucus; pulse small, weak and sharp.

Sumat statim Ol. Ricini ℥i. *et postea imponantur Hirudines* xx. *parti dolenti, et habeat Calomel.* gr. x. *Opii* gr. i. *mane et vespere. Infricetur ungt. Hydr.* ʒi. *ter quotidie.*

11th. Pain was relieved but not removed by leeches. A blister was applied last night, and he has not felt the pain since. Stools yesterday copious, partly chalky, and partly yellow; skin moist, and of natural temperature; slept well; lies on his left side.

On the 13th, mouth ran a little, and pills were omitted. He had no pain afterwards, and being very impatient at being detained in hospital, I was very improperly induced to discharge him on the 22d.

Readmitted 7th August. Says that though weak he was free from complaint since his discharge, till yesterday at ten A. M. when he was seized with symptoms of fever, headach, and pain in the back. Had an emetic in the night and a dose of calomel, which have been followed by vomiting and purging, with removal of the febrile symptoms. Pain of the head and back are now slight; the pulse and skin are natural; the tongue is coated and yellow, and the urine tinged with bile.—*Pulv. Jalapæ comp.* ʒi.

8th. Freely purged. Fever for two hours yesterday, and had griping in the evening, which was relieved by fomentations. Since midnight has had severe pain of the upper part of the right hypochondrium, preventing free inspiration. Pulse small and compressible; skin is moist.

Hirudines xxv. *parti dolenti. Calomel.* gr. ii. *Antimon. Tart.* gr. $\frac{1}{6}$ *ft. pil. 4ta quaque hora sumenda.*

9th. Pain removed. No fever. Nausea from pills, and complains much of weakness and general pains, and uneasiness. Countenance is depressed, and the pulse is quick and small.—*Omitt. Pil.*

11th. Had some pain of the side again on the 9th, for which a blister was applied and gave relief. Had pain of the loins yesterday; feels very weak; skin cool, and he sweats a good deal; pulse very small; gums tender. Takes a blue pill at night, with a grain of aloes.

12th. Has pain to the right of the last dorsal vertebra increased on full inspiration, and on pressure below the last rib; skin natural; sweated in the night; pulse 72, small; bowels regular.

Applicetur Emplast. Vesicatorium parti dolenti. Omitt. pil. Habeat Calomel. gr. x. *Opii* gr. ii. *hora somni.*

13th. Little pain since the blister began to rise. Heat of skin in the evening; it is now moist. Complains of great debility; pulse 90, small, and easily compressed; stools clay-coloured.

Habeat statim Ol. Ricini ℥i. *et hora somni Calomel.* gr. x. *Opii* gr. ii.

15th. Pain in lumbar region complained of on the 13th, and again yesterday, for which eight leeches were applied, and is now relieved from it. Two green stools; tongue less furred; and pulse is a little stronger; appearance improved; rested tolerably; takes no medicine. To have a dose of castor oil, and nitric acid drink.

17th (vespere). Stools on the 15th yellow; yesterday of a pale yellowish white colour, and bowels have not been opened to-day. Pain of back has returned, and shoots into the side; eats very little; skin warm and dry.—Eighteen leeches to be applied to the side, and to have a purgative enema.

19th. Relief from leeches, but pain is still felt at times; and now complains of a dull pain, increased on pressure, below the edges of the ribs, where a fulness is perceptible; and the uneasiness and tenderness extends over the epigastrium; pulse 90, weak. Had ten grains of calomel with two of opium at bed-time; which is to be repeated three times a day, and a large blister to be applied to the side.

24th. Blister gave temporary relief, but caused pain in the hypogastrium and strangury. Continued calomel to the 21st, when it was omitted, and mercurial frictions substituted. Had pain on the 20th and 21st to the left of the spine; stools brownish-yellow, or green, or variously coloured, and slimy; is feverish occasionally in the evenings, and has headach; tongue furred, foul taste; pulse small, sharp, and easily compressed; mouth feels sore, and he spits a little. The back and side are very painful, and fulness and tenderness below the margins of the ribs are increased.

26th. Slight temporary relief from a blister. Mouth runs very little; pulse 70, but intermits occasionally.—*Omitt. Med.*

29th. Yesterday evening there was an intermission of the pulse after every second beat; and to-day the pulse is 70, and intermits one stroke after every third beat, in which the heart corresponds. Has occasional strong pulsations at the heart. Mouth still sore. Takes an anodyne at night, and nitric acid drink.

September 1st. Bowels open, and stools are natural; but last night had griping and pain over the abdomen, particularly to the right side; and he complains of pain and great tenderness of the space between the edge of the ribs, the umbilicus, and the middle of the lumbar region, which is distended and hard, and the indurated edge of the liver may be felt. Pulse 90, very small, but not irregular. Had leeches applied without relief, but has been comparatively easy since he had an anodyne draught, with antimonial powder, fomentations, and a large poultice to the side. Lies generally with the thighs bent on the body, and his head and trunk bent to the right side.

3d. No relief or rest. Sits in bed bent to the right side. Tension and fulness extend nearly to the umbilicus; and there is a considerable swelling at the posterior part of the hypochondriac region, the ninth rib being protruded. Pulse frequent, sharp, small, and easily compressed. Has been using mercurial frictions, but there is hardly any ptyalism. To use poultices and fomentations, with anodynes at night.

8th. Bowels have been costive, and hard lumps of natural-coloured fæces have been removed by oil and enema. Fluctuation is recognized in the swelling; and pain is slight, except for a short time at distant intervals, when it is confined to the tumour. He describes it as a shooting pain, with some pulsation. Had a sense of suffocation in the throat twice yesterday, and could not speak for a short time from globus in the throat. Skin was hot for three hours yesterday evening.

8th (vespere.) Much pain in the tumour, and severe griping. Seven stools, composed of thin green fæces, with white mucus, and what appears to be purulent matter, passed with straining. Thinks that what he passes comes from the swelling below the margin of the ribs. Slight nausea; pulse very small. He is in great distress. At six P. M., the swelling was opened below the ninth rib, which was found to be denuded of its periosteum, and a pound and a half of good matter, of a reddish tinge, was evacuated, when he got faint, and a poultice was applied to promote the gradual discharge of the remainder. Has had ten ounces of wine, and has taken eighty drops of tincture of opium.

9th, Free discharge in the night. Swelling below the angle of ribs nearly subsided, and the skin over it is not now hot as before. Pulse 85; two stools as yesterday.—*Habeat Ol. Ricini* ℥ss. *cum*

Tinct. Opii min. x. Continue wine and arrow-root, and to have beef-tea.

10*th*, Has been very comfortable since report. Discharge good, and not very copious. Took his sago and beef-tea. Stools green, mucous, and mixed with some dark slimy matters: they are passed suddenly with griping and tenesmus. To have half an ounce of oil, and afterwards two grains of opium.

11*th*, Had two opium pills yesterday, and eighty drops of tincture of opium, and an anodyne injection at bed-time, which he retained a very short time. Was not purged in the early part of the night; three stools since 3 A. M., fœtid, of a whitish colour, and seem mixed with purulent matter: about an ounce and a half of good matter discharged from the wound. Pulse feeble; breathing a little quickened.

18*th*, Discharge from wound continues good and not very copious; it flows out pretty freely when at stool. Since last report has been severely purged, and frequent doses of opium, anodyne draughts, and enemas, and chalk mixture with catechu have little effect. Stools vary very frequently, being sometimes brownish and feculent, at others watery, green and slimy, or consist of reddish or greenish water, with sanious smell, and occasionally mixed with dark mucus and puriform fluid. Yesterday, was only purged seven times, the last three stools being feculent and intermingled with perfectly good purulent matter. Feverish in the evenings, and sweats much. The pulse is small and feeble, and varies from 90 to 100. Takes an egg or a little sago and port wine, or boiled milk, but is purged after eating. Loses flesh and strength, but suffers little pain.

24*th*, Does not get weaker. Bowels are more regular, stools being now feculent or of a light-yellow colour, with an occasional intermixture of purulent matter; less sweating, and rests well. Has had a return of pain in right lumbar region, and last night in side; pulse 86. A bitter infusion with nitric acid was prescribed but griped him. There is some swelling of the integuments behind the wound.

27*th*, Had some return of pain in abdomen and back yesterday afternoon, but he is now quite easy. Five consistent brown stools during yesterday, and none in the night. Slept tolerably; pulse 76; thinks himself weaker.

October 2*d*, Had a shivering fit on the 28th, after the wound was dressed. Has pain in the back at times; sweats much. There is free discharge of dark-coloured pus, and he complains of pain and swelling of the integuments over the ninth rib, a little above and behind the wound. No purging; stools sometimes clay-coloured, at others, yellow or green. Abscess is still very large, but discharge is of better appearance; pulse 84; some bilious vomiting.

10*th*, Has rather improved since report. Sleeps and eats pretty well; discharge thin and dark; has pain at times between the umbilicus and right hypochondrium; and on the 7th and 8th complained of a feeling of sinking and faintness; stools white, sometimes tinged yellow.

16th, The edges of the wound are sloughy. Has burning in the throat, and pain of left hypochondrium yesterday,—relieved by fomentations.

23d, Complains occasionally of pain of left side; stools dark and viscid. Shivering and fever last night.

27th, Weaker; coughs up a thick dark viscid matter; gangrenous ulceration spreads round the sloughy edges of the wound; less appetite.

30th, Gangrenous ulceration spreads; expectorates the same dark puriform viscid secretion as on the 27th; it is now tinged with blood, and produces a sense of suffocation. Three stools last night, of a gray colour from intermixture of pus; sleeps a little in the mornings; sweats profusely.

November 9th, Is weaker; eats hardly any thing; takes a bottle of wine daily. Cough very distressing, and expectorates the same matter as before. Had cutting pain across the epigastrium on the 6th. Bowels were costive, and hardened feces were passed with difficulty, for which he took oil. Can now hardly retain his stools; makes much water. Left foot, which was cold, painful and swollen, is easy since the application of a flannel roller; right arm nearly powerless.

11th, Coughs seldom; little discharge; slough spreads, forming a large sore covered with slough at the edge, underneath which there is an ulcerated surface, covered with large round granulations; very low; pulse thready and rapid; petechiæ over the body.

14th, Complains of gathering of the bowels into knots, which are very painful; is dying.

16th, Died at 11 A. M., two months and eight days after the abscess was opened.

Dissection.—The liver was extensively adherent to the ribs, and the first abscess appeared to have nearly closed up, but the probe passed into another large cavity into which the first had probably made its way. This abscess was crossed by membranes and obliterated vessels, left by the destruction of the parenchyma of the liver. In the wound lay the rib divided by a line of caries; and it was found to have been killed through its whole length, although in the chest it was covered by the pleura and periosteum not perceptibly diseased; the ligaments uniting it to the eighth and ninth vertebræ were destroyed, and these vertebræ were carious at the part where they were in contact with the rib. Another abscess occupied the concave surface of the left lobe, which was firmly attached to the small edge of the stomach, this part of the coats of which were greatly thickened; and the abscess opened into it by two apertures, one round and small, the other near the cardia, large and irregular. The stomach was otherwise healthy. Internal surface of this abscess was smeared with green matter: the rest of the liver was not much diseased, although rather pale in colour. The gall-bladder was small and full of dark bile. The upper part of right colon was adherent to the surrounding parts, but no communication existed between it and the abscesses in the liver. Its mucous coat presented some small ulcers. The right kidney was attached to the liver. The other viscera were healthy.

The right lung was slightly adherent to the diaphragm; and it was firmly united to the diseased vertebræ, where several irregular abscesses communicated with the carious bone, with the bronchi, and each other. The rest of this lung was healthy. The left lung was strongly adherent to the pleura, and much diseased; its substance hardened, full of small hard grains and gritty particles, and a few small abscesses; and some water was contained within the pleura.

Remarks on Case II.—It is hoped that the lengthened abstract of the voluminous daily reports above given may be considered to be justified by the interest of the case, in which an unusual number of the phenomena occurring in liver abscess were united. The treatment I am by no means prepared to justify, especially the continued use of mercurials and the frequent repetition of leeches, when matter had no doubt already formed. Yet, although from certain circumstances to be hereafter noticed, I should have been very suspicious of the formation of matter, when greater experience had rendered me more alive to their importance, I would earnestly caution the practitioner in warm climates from too readily adopting the belief, that the symptoms usually ascribed to abscess in that organ, even when present together, certainly indicate it. Shivering, evening fever, emaciation, tumefaction of the side, and puriform discharges from the intestine, not unfrequently take place, where there is no formation of matter in the liver; and in many cases which are supposed to have recovered from abscess, it had evidently never existed. I once watched the progress of a case in which an experienced practitioner was so satisfied of the existence of a large abscess in the substance of the organ, that even when the liver was on the dissecting table, he pointed to the right lobe as containing a great accumulation of matter, when it was merely enlarged and softened in its structure. Nor is it a matter of small practical moment to conclude, that disease of the liver has gone on to abscess when the organ is only enlarged, or in a state of chronic inflammation; as the omission of local depletion, counter-irritation and of mercurials, may lead to the formation of matter, while their continuance after it has taken place, although almost always wrong, can, in the majority of instances, only hasten on the fatal termination, which no means could have prevented.

This patient like the last fell a victim to marching during May and June, the hottest months of the year, in a climate the mean annual temperature of which is 80°; and these months are 10° and 13° above this respectively; with 18° to 21° mean diurnal range, the maximum being a little above 100°, while the minimum seldom falls below 90°.* At this time, no troops were allowed to march till half-an-hour after sunrise, in consequence of an opinion adopted in certain quarters, that cholera, which is so frequently destructive to troops on the march, is caused by miasmata which would be dispersed by the heat of the sun; an opinion not entirely without foundation, but which should never have been adopted without reference to season, particular climate, and other circumstances, and which proved most disastrous to this small detachment of young soldiers, several others of whom had their health permanently destroyed by liver disease contracted during this march. It is so seldom that military authorities will attend to the best considered medical advice, that too much caution cannot be observed by those who have an opportunity of offering it; nor would it have been difficult to have foreseen the effects of marching European troops on foot, in woollen clothes, and loaded with arms from half an-hour after sunrise, till 9, 10, or 11 A. M.; and who had then to wait till their tents came up, an hour or two for breakfast, of which they partook when exhausted by fatigue, thirst, and the direct rays of a burning sun and soil. Nor are the ill effects of marching at such a season entirely done away with, by avoiding this extrême degree of exposure, as I have had twice an opportunity of witnessing when marching in charge of European troops during the hot winds. It is melancholy to think that European soldiers should, in times of profound peace, be exposed at such seasons, which the natives themselves avoid; but it is some consolation to know, that the regular exercise, and greater temperance usual on a march, with the dryness of the air, and of the ground on which the men sleep, do not tend to the production of disease; and that marching in the rainy season, especially in the basaltic districts, where the soil is deep and retentive of moisture, and fever is usually prevalent, is even more injurious. Of this a remarkable example occurred to me in 1828, in six men who rejoined the horse and foot artillery at Nogpore from the coast, and who were all admitted into the hospital on their arrival; and their future history was brought to the notice of the military authorities, in the end of 1829, as follows; " Four never recovered, one died in May 1829; one has been discharged the service: another has been sent to the coast on sick leave; and the fourth will probably be discharged next committee. The remaining two have had very frequent relapses since; and the non-commissioned officer sent with the party arrived labouring under severe fever." An order was in consequence issued, prohibiting men from being sent through the jungles during the rainy months; in which it is to be regretted that the season of the hot winds was not included. So much more depends on the prevention of disease in hot climates, than on the most judicious treatment, and it is so seldom that facts such as may make an impression on non-professional men occur, that this digression will not be thought out of place, and was indeed one reason for selecting these two cases for illustration.

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* Journal of the Asiatic Society of Bengal, Vol. ii. p. 239 and 542.

The tendency to relapse in hepatitis is very great, if indeed the cure be not often merely apparent, and subsequent attacks are in general attended with similar symptoms to those of the first, showing that the injured part continues for a long time liable to suffer from the slightest causes of disease ;* but, in this cases, it is probable that disorganization had taken place previous to admission into hospital; as on the second day of the disease, the pulse was small and soft, with acute pain of only two days duration and all the other symptoms of severe disease. The situation of the pain also, below the floating ribs and in the lumbar region, and its being increased by pressure at a distance (over the ribs) are so like those in Gill's case, to be hereafter noticed, and others in which matter had evidently formed, that I conclude the same had taken place here. The state of the pulse forbade general bleeding, and leeches gave temporary relief; but it is needless to trace the effects of remedies that could do no real good,—further than to observe, that the pain frequently returned and was often relieved by the leeches, blisters, and fomentations; and that these repeated exacerbations of pain seem to arise from the presence of the abscess irritating the parts, the pain in the inflammatory stage not being so easily removed, and not returning so suddenly. The faintness, depression of countenance, inability to taste food, and the small, feeble pulse on the second and third days after admission, were also, probably, connected with abscess, there being no symptoms to account for them; but at a station where fever is prevalent, and more especially where paroxysms resembling intermittent occur, it is difficult to determine the real nature of the symptoms.

Between the 22d and 25th June, he had thirty grains of calomel, and the gums became tender, although during this time he was daily purged; and afterwards he took a good deal of mercury, and salivation was induced; but it was never free, lasted a very short time, and even subsided when using the medicine; nor did it seem to relieve the pain, which got worse when the mouth was most sore, and the secretions were little influenced by it; while, in combination with tartar emetic, it irritated the bowels, and its general action could not but be injurious to the constitution at large. In Senior's case also, twenty-seven grains of calomel, taken from the 29th June to the 2d July, made the gums sore, and on the 2d, six grains, though combined with opium, brought on mucous purging; but afterwards, though a good deal of mercury was taken, natural ptyalism was never produced. These and innumerable other cases clearly show how erroneous the notion is, still very generally prevalent, that an extreme torpor of the absorbents exists in severe hepatitis, dysentery, and remittent fever, and that this is the cause " why the largest doses internally, and the most assiduous inunctions externally, will sometimes fail in introducing a sufficient quantity of mercury to saturate the system."* And hence the use of calomel in scruples and drachms daily, and rubbing in mercurial ointment, without reference to quantity, under the idea that all that has been taken or rubbed in before has not entered the system, and can therefore have no effect on the disease or the constitution. But if it be true that the mercury is absorbed, and mixes with the circulating fluids, how injurious must such practice be, when the medicine employed is one of such unequalled value in these diseases, but at the same time so energetic in its effects on the various tissues and organs, and whose mischievous effects remain so long in the constitution that has been thus poisoned with it; and how little to be wondered at is it, that many practitioners run into the other extreme of discarding it altogether, or of combining it with a severe and mischievous course of purgation, that may indeed sometimes obviate these evils, but, at the same time, take from our hands the power of using it effectually, and in regulated quantity; and proves directly injurious by irritating the intestinal canal, of itself (in such cases) too liable to take on disease, and by depressing the powers of the constitution in a greater degree than the freest and most effectual depletion. Considering this question as one of vital importance, and without satisfying myself regarding which I could not practice in India with any satisfaction, I was not content with the study of my own cases, but obtained and carefully analysed the records of some other hospitals, the intelligent physicians of which were more or less influenced by the notions referred to; and I found, that when great quantities of mercury had been unsuccessfully employed, (with the exception of extremely few cases, that might be explained by imperfection in the records, or by idiosyncrasy,) the gums became more or less sore after the exhibition of very moderate quantities of the medicine, and that in general a slight and evanescent ptyalism took place very early, showing clearly that it did enter the system, and that its usual sensible effects were prevented by the existence of disease overpowering its action. When, therefore, the gums or salivary glands are at all affected by moderate doses of mercurial medicines, and when during their continuance the partial salivation becomes less marked, and the gums less tender, or when the effect of the medicine does not become more evident, or when it too rapidly diminishes on its being omitted, it may be certainly concluded that it will not affect the system in a beneficial manner until an impression is made on the disease by other means, and that it is always necessary to stop its exhibition when a moderate quantity has been prescribed.

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* A large proportion of abscesses in the liver, take place in the situation, or as a consequence of former attacks of hepatitis: few cases with acute symptoms terminating in abscess on the first admission.

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* I have had a couple of Malays daily employed for hours at a time in unsuccessful frictions, the lymphatic system refusing to take up the ointment in any considerable quantity."—Johnson on the Influence of Tropical Climates.

It is the irritation of the disease, as above stated, that prevents the mouth becoming affected in liver disease, in dysentery, in peritoneal inflammation, and still more in fever, in all of which there are abundant proofs of the mercury having been absorbed, in the severe salivations, loss of teeth, pains of the limbs, and affections of the periosteum, that too often follow its employment, especially in those cases in which unsuccessful attempts have been made to affect the mouth in the early period of the disease. It is, however, necessary to be aware, that a slight degree of irritation is sufficient to stop salivation for a time, even when fully established, and that, therefore, it may not always be proper to omit the medicine, until it has had a fair trial. Thus the paroxysm of an intermittent will sometimes dry up the mouth during the hot fit; and I have seen the same happen from the excitement of a blister. Hence the observant practitioner must not omit to use any assistance to be derived from the peculiar appearance of the gums, the character of the saliva, and other means by which his judgment may be assisted; it will, however, seldom happen, that, when depletion has been as freely used as the case will permit, mercury can be safely continued, when its effects on the mouth either diminish or do not advance under the use of moderate doses. These remarks are also applicable to a rule insisted on by some authors, that a sore mouth is useful as an index of the system being impregnated with mercury, and should therefore, if possible, be induced.

In comparing the remarks page 368, and the symptoms on the 11th and 12th August, of pain of the loins and to the right of the lower dorsal vertebræ, increased on pressure below the twelfth rib, great debility, sweating, and very feeble pulse, with the appearances on dissection, there can be no doubt that abscess had already taken place, when the patient thought himself well, and was able for the active duties of a horse-artillery-man; a fact seldom admitting of such clear proof as in these two cases, and deserving of attention in reference to the prevalent notion of the rapid progress in hot climates of hepatitis into abscess, derived from the frequent obscurity of the early symptoms, and also as explaining some of the anomalies in the effects of remedies on the constitution. When neither the pulse or general health sympathize much with the internal mischief, it is not surprising that mercury should in some cases affect the system in the same manner as it does in health. For example, a moderate liver abscess confined in a thick and callous cyst, may lie long dormant, and when it at length produces inflammation in the surrounding hepatic substance, the secondary inflammation may seem to demand depletion, and the mercury prescribed will sometimes act as it would have done in an inflammation arising from any other cause, the collection of purulent matter merely acting as a local cause of disease. But as the exciting cause is irremediable, it is seldom that well-marked cases of the kind occur, and that the pulse does not clearly contraindicate general bleeding, the use of drastic purges, and " saturating the system with mercury;" and it cannot be too strongly impressed on the young practitioner, that the obscurity of many cases rather arises from the carelessness of the patient, or of an insufficiently minute examination on the part of his medical attendant, than the absence of symptoms by which the existence of internal disorganization may be detected. Thus a gentleman, regarding whom I was consulted, while leading a gay life, and partaking of daily festivities, was observed by an experienced practitioner to look ill, and on being questioned, admitted the existence of some disorder of the stomach only, yet the pulse was 100, and on examination the presence of abscess was easily ascertained.

A still more destructive principle adopted by many practitioners, connected with the supposed non-absorption of mercury in severe cases of intertropical disease, here requires notice; viz. that it exerts a specific effect, which, when its constitutional effects can by any means be obtained, will certainly supersede the diseased action, whatever it may be; or at least that it is only by such action that health can be restored. Hence the continued courses of mercury in syphilis in former times, and the still more injurious practice of continuing mercurial medicines in hepatic disease and in dysentery, either to the recovery or death of the patient. I shall select a few examples of this from the records of hospitals under very intelligent practitioners in 1816 and 1828, to show that the evil is not one of imaginary importance, or undeserving serious attention.

Case. III. John Prickles, aged 31, admitted into hospital 25th January 1816, complaining of violent flux of ten days standing previous to admission, when stools were incessant, chiefly of blood. The abdomen was tense, especially in the course of the colon, which was hard and tender to pressure. Putrid shreds were passed and hung from the anus, and were easily removed. Had severe pain previous to admission, which has subsided except before stool, in the lower part of the rectum. Pulse rapid and feeble. Besides an emetic, purgative and emollient injection, he had calomel in ten and five grain doses with laudanum. He rapidly sank, the medicine having no more effect on the system than "on any inanimate matter." The pulse got more feeble, hardly to be numbered, and intermitting every three strokes; there was dysuria, vomiting, and hiccup; skin greasy; was long of answering questions, but sensible. Died February 4th.

Dissection.—Parietes of abdomen adhering to the surface of the liver and colon in many places. The colon gangrenous in many parts, and had given way at the vermiform appendix and sigmoid flexure. Between these two points the gut on being laid open was found enormously thickened, and numerous warty excrescences projected from its inner surface, some of them as large as a walnut; hard as cartilage at their base, and rugged and uneven like a cauliflower at their apex, which was ulcerated. In the right lobe of the liver there was an abscess containing about a pint of purulent matter.

The disease was beyond treatment before admission, and certainly calomel should not have been continued till the day before death, when he was ordered "*Habeat quodcunque appetat.*"

Case IV. H. Thomas, aged 40, had been subject to an affection of the liver for some years. On the 12th September 1814, was again seized with pain of the right side, attended with fever and diarrhœa, for which he lost sixteen ounces of blood. On the 16th, was transferred to the care of another surgeon, when he complained of great pain in the region of the liver, and in the shoulder. Pulse full and hard: skin hot and dry; tongue white; many fœtid stools; great debility. He was bled to twenty-four ounces; and three grains of calomel and of ipecacuan twice a day, and mercurial inunctions were ordered. He was not relieved by the bleeding; and on the 17th the pills were repeated every second hour, and he had the warm bath. On the 18th, the pills were omitted, and the warm bath, which caused sweating, was repeated; but on the 20th the breathing was quick and short, the pulse hard, full and strong, and he was otherwise worse. He was bled to thirty ounces without relief. On the 20th had a feeling of something heavy near his heart; and an abscess in the perineum had burst. On the 21st was free from pain; countenance very sallow; looks depressed; eyes glossy; and pulse moderate. There was a large firm tumour on the anterior superior edge of the right lobe of the liver, which was not painful to the touch. On the 25th, the tumour was painful on pressure, the pulse was soft and low, and the stomach was irritable; there was no fluctuation perceptible. The mouth could not be affected, although the calomel in combination with opium was continued to the last day of the patient's life. He died 2d October. The lungs and heart were healthy. The right lobe of the liver contained two abscesses: one in the anterior edge of the liver, at some distance from the surface of the organ, contained an ounce of greenish-coloured lymphy fluid: the other on its convex surface contained nearly a pint and a-half of thin purulent fœtid matter. The whole right lobe adhered to the diaphragm, stomach, and colon. A small abscess containing half an ounce of white matter was found in the left lobe. The stomach and intestines are stated to have been healthy. The liver was pushed down by the abscess in the upper part of the right lobe, so as to be felt below the margin of the ribs; a circumstance of much less common occurrence than one might infer it to be, from tumefaction in the region of the liver being constantly mentioned as a symptom in hepatitis, as well as where an abscess was formed in the substance.

In such a case as this, the mercury, which was used till the patient was moribund, could only have been injurious. *

Case V. In another case of acute hepatitis attended with violent pain, full hard pulse, short and quick respiration, general irritability and watchfulness, that occurred in the same corps at the same time, (September 1814,) the patient lost, during the first five days, 120 ounces of blood, and on the ninth day he lost 24 ounces more, and again the same quantity on the 12th; and mercury was used in various forms. On the 16th day the mercury had not affected his mouth; there was some delirium and great debility. On the 19th day, the mercury was omitted. At this time he was thought to be convalescent, being free from pain, turning in bed without uneasiness, and complained only of slight cough and some evening fever. He now began to cough up purulent matter occasionally mixed with blood. The pulse is stated to have been full and hard. Calomel was again administered, combined with antimonials or squills. On the 30th day there was moaning and delirium; he vomited greenish matter, and the pulse sank. On the 31st, he had cold perspiration and faintness, and the matter then expectorated was reddish-coloured. On the 32d day expectoration ceased; he was more composed and rational; pulse quick and hard. There was debility with short respiration, and soon after picking at the bed-clothes, and he died on the thirty-third day after admission.

A pint of reddish matter was found in a large abscess in the posterior portion of the right lobe of the liver; its surface was strongly adherent to the diaphragm, through which there were several perforations, by which the matter had passed into the right lung and cavity of the pleura. In other respects the viscera of the thorax were healthy.

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* Blood-letting was certainly carried too far in this case; but it is interesting as an example of the free use often made of the lancet in India, before its employment could have been influenced by the opinions of certain authors who have obtained credit for its introduction; when in truth they only adopted the practice they found in use, and in some instances recommended it on insufficient experience and erroneous reasoning, and without the requisite restrictions. Compare this case in an old soldier, long resident in India, (and the next) with Dr Johnson's case (Tropical Climates, p. 168, ed. 3d), in which the patient's "having previously made a voyage to India," is mentioned with a view to enhance the author's boldness in using the lancet. Had it not been my object to show the erroneous practice of using mercury in all stages of hepatic disease, rather than to trace the history of the antiphlogistic practice in the East, I might have selected cases in which it was much more judiciously employed than it has been, in too many instances, since the influence of the writers referred to, has led to the rude and indiscriminating employment of the lancet, drastic purgatives and calomel, in unmeasured doses.

The impropriety of the repetition of calomel in this case is evident. The history is also useful in showing the necessity of accurate attention to the pulse, which was here recorded as hard and even full, when the patient was moribund; but I have little doubt that the pulse presented that peculiar irritable, full or bounding character with hardness, but without strength, common in hopeless disease. In such circumstances, the treatment should be confined to removing all sources of irritation, supporting the patient's strength, and, perhaps, in such cases as the present, overcoming any extension of inflammation by a few leeches, counter-irritation, &c.

The delirium I ascribe rather to the long-continued irritation of confined matter, than to the old notion of inflammation of the diaphragm; and the partial removal of this, when the matter penetrated into the chest, was followed by the subsidence of all the symptoms. Occasionally the delirium attending the last stage of hepatic abscess is violent, accompanied by furious gestures, eyes red and starting from the sockets, hot skin, and a pulse, that for a short time is far from weak, the state of the brain producing a fallacious appearance of strength, both of the heart and voluntary muscles. In a case of this kind, in which there had been pain of the side in a slight degree for a few hours only, during the whole illness of the patient, the following appearances were presented on dissection.

The vessels of the *pia mater* presented some turgescence, and a considerable quantity of fluid was found in the ventricles and at the base of the brain. There was extensive, loose but old adhesion of the lungs and pleura. The left side of the heart was rather larger and thicker than usual; the stomach was natural The liver was not adherent, but contained many abscesses in the right lobe, which was greatly enlarged, but much of its substance natural; the gall-bladder was large and full of green thin bile. The duodenum also was full of bilious fluid; the rest of the small intestines contained clear mucus only, and their coats were healthy. The colon contained dirty yellow fluid fæces; its coats, except near its lower extremity, appeared healthy externally; but a few large round ulcers had destroyed portions of the mucous coat, and left the muscular fibres bare; there was some thickening of the sigmoid flexure and rectum, with a few ulcers of the mucous membrane; and there were many flat livid tumours or thickenings of this coat, into which no vessels were seen to enter.

I have known a case of this kind mistaken, by a surgeon not sufficiently informed of the previous history of the patient, for fever attended with acute affection of the brain, and general and local bleeding employed. I shall defer the further consideration of cerebral affections arising from liver disease to some other opportunity, when the connection of hepatitis with fever and bowel complaints may be considered; and conclude these remarks on the abuse of mercury by a single example of a more recent date, selected from numerous others, in which the use of the mineral was continued at a stage of the disease when it could only prove injurious.

Case. VI. ——— a young man, one year in India, was admitted (25th July 1828) into Hospital, on the seventh day of his illness, labouring under severe dysentery. The treatment consisted principally of small doses of calomel and ipecacuan, purgatives, and leeches. On the 31st, the stools were black, slimy, and mixed with blood. He complained of soreness of the mouth, and ulcers on the inside of the lips; but there was no ptyalism; and Dover's powder every third hour was substituted for the calomel and ipecacuan. On the 1st August, the stools were composed of mucus and blood, and there was straining, tenesmus, and difficulty in voiding his urine. Twenty-four leeches were applied in the course of the ascending and descending colon with temporary relief, and on the 2d August a blister. The cheeks and gums were now covered with ulcers, and there was no ptyalism; pulse 120. He took a scruple of calomel with opium and ipecacuan; and mercurial frictions and the tepid bath were ordered. Next day the stools were very frequent, consisting of blood and water, or resembling the washing of raw meat, and very fetid; the abdominal pain gone. The calomel and ipecacuan pills were repeated as at first. The same night he passed stools involuntarily, and had hiccup. On the fifth he was restless and delirious, complained of abdominal tenderness, and passed his stools involuntarily. The calomel was now omitted. In the course of the day he passed a membranous substance, resembling intestine, in a state of disorganization, * along with much coagulated blood; and he died during the night.

Dissection.—The small intestines were adherent to each other and to the mesentery, with blushes of inflammation at different places. The colon was much inflated, and at the sigmoid flexure its coats were ulcerated, and purulent matter was extravasated into the abdomen. The mucous coat was ulcerated or gangrenous in nearly its whole length. The liver was enlarged, and the other viscera of the abdomen and thorax were healthy.

He had taken a drachm of calomel previous to the 31st. The mouth was ulcerated; there was no ptyalism; and all the symptoms were aggravated; which too surely indicated disorganization of the great intestines. The mineral was therefore very properly omitted. But how powerful the influence of the opinions which I am endeavouring to combat was, even with the able physician by whom this case was treated, is evident from the recurrence to the use of the mineral on the 2d of August, and its continuance till the day before the patient's death. When it had caused ulceration of the cheeks and gums, there could have been no torpor of the absorbents preventing its absorption †; and when it produces such effects, I am satisfied that it acts as a poison to the system rather than as an antidote.

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* In a case very similar to this, a membranous substance, passed by stool along with coagulated blood, appeared to consist of the fibrine of the extravasated blood, separated from the red particles in its passage through the colon.

† "When the mouth becomes affected it is very satisfactory, because it shows that the absorbents and glandular system are not in a state of torpor."—Annesley's Sketches, p. 291.

I might adduce other cases where the same objectionable practice was adopted in the treatment of abscess of the liver, and other incurable structural diseases of that viscus; but as they possess other points of interest which would render too much detail necessary, I shall reserve them for another opportunity; and refer to Dr O'Brien's case of abscess in the liver, in the first volume of the Transactions of the King's and Queen's College of Physicians, p. 65, in which mercury was employed after the existence of matter was ascertained; another by Dr Geoghegan, p. 195, of the same volume, in which calomel and purgatives were used after fluctuation was perceptible; and to Dr Elliotson's practice, as recorded in the Lancet, February 25, 1832, in which large quantities of mercury were used, at first as an antiphlogistic; and afterwards, when the abscess had nearly pointed, and there were severe shivering fits, to cause absorption. Even Mr Twining, whose work has done so much to improve the practice of medicine in India, ordered calomel in his 8th case of dysentery when bleeding into the intestine and gangrenous ulceration had taken place; and his 9th patient had his countenance blanched by bleeding, which was employed when the disease was too far advanced to be benefited by it, and the blue pill with ipecacuan were ordered the day before death; a practice equally wrong in principle, and only preferable to the use of calomel on the grounds of the inferior power and efficacy of the medicine. In stating my objections to the employment of mercury in states of disease, that cannot be benefited by it, I hope that I shall not be understood to advocate the neglect or inefficient employment of that most valuable remedy, or to object to the excellent rule laid down by Sir George Ballingall, of introducing the medicine more slowly into the system, and of continuing it longer in old cases of liver disease, than is either necessary or proper in recent ones. (Ballingall on Diseases of India, p. 114.)

The enlargement of the abscess and its effect in displacing and disordering the functions of the other viscera were very gradual. The action of the heart did not become irregular till the abscess pushed the liver beyond the edge of the ribs; the pulse becoming first slightly irregular, then with an interval after every second beat, and as the external pressure diminished by the protrusion of the rib, the abnormal action subsided, and did not again return. Irregularity of the pulse and palpitation of the heart is not an unfrequent occurrence in these cases, as might be expected in a disease that sometimes presses the heart out of its natural position, and has terminated by the bursting of an abscess into the pericardium. It does not always depend upon pressure on the heart, but may arise from obstructed circulation from tuberculated liver or other forms of organic disease, and may terminate by sudden death. It is, however, necessary to be aware that water within the pericardium may be mistaken for diseased and enlarged liver, of which I have elsewhere recorded three striking examples. (Practical Essay on the History and Treatment of Beriberi, p. 173 and 193.) The position assumed by the patient when the abscess in the liver is of considerable size or adherent, is often very striking, the distension of the abdomen and pressure of the diaphragm causing him to seek relief by drawing up the thighs on the abdomen, and bending the body to the right side, or by sitting up in bed leaning to the same side; a circumstance that will help to distinguish the disease from water in the pericardium, and some other complaints with which it has, and may again be confounded.*

On the 8th September the third abscess burst into the stomach, which did not show any unusual irritability; the retching on the 21st August being probably caused by the antimonial powder combined with the calomel. The reports show that the bursting of an abscess into the digestive tube is attended with distress, nausea, and sinking of the pulse; and that the purulent matter may pass through the whole intestinal canal unchanged, but that it irritates the bowels, causing purging with tormina and tenesmus; or the stools may have been green and watery, from the pressure being removed from the gall-ducts, or from the bile which was mixed with purulent matter in the abscess. The patient felt as if the matter came from the protruding part of the liver, the diminution of the general tension relieving the inflamed and tender parts around the pointing abscess, more than the comparatively insensible ones immediately around the deep-seated disease; and led to the error, hardly to be avoided, of supposing that the external abscess had burst into the colon. The other abscess was opened with the view of relieving the remaining distension that caused such severe distress, and also in the hope of promoting the closure of the supposed opening into the colon. The first object was attained; the patient even regaining flesh and strength; and the rest of his life was passed in comparative comfort; which is itself a sufficient reason for operating, whenever there is good ground for thinking that adhesion has taken place, even when the case is otherwise hopeless. But a much more forcible argument for doing so, is derived from the tendency of the matter to burrow into the soft substance of the liver, forming new and irregular cavities, crossed by the more resisting membranes and obliterated vessels, or having the blood-vessels hanging loose into its cavities, either closed by lymph or loose coagula of blood; and in one case these had given way, in consequence of which the abscess was distended with blood. The imperfect nature of the adhesive process in very many cases of abscess of the liver is also shown, by the frequency with which the purulent matter, either in the cavity or when coughed up through the lung, is found mixed with bile; and in the case of M'Donald (Medico-Chirurgical Transactions, Vol. xxi.) I found it had passed into the gall-bladder, by means of one of the hepatic ducts which opened on the surface of the abscess. To this cause is to be ascribed the greater chance of recovery that seems to exist when an abscess points below the edge of the ribs, than when the matter has to make its way through the greater thickness of parts, where it is covered by the ribs. Exceptions to this will, however, occur when the matter is deep-seated and reaches the abdominal parietes through the hepatic substance, as in Dr O'Brien's case, already referred to, which by no means justifies the sweeping inference that an abscess affecting the substance of the liver will never be cured by operation, and that all the successful cases on record have been abscesses of the peritoneal coats; a form of disease certainly far more rare than the remarks of Dr O'Brien, Mr C. Hawkins, or his reviewer (Med. Chirurgical Review, January 1834,) would leave us to believe. The cavity of the original abscess in Burgess was nearly closed by the pressure of the surrounding parts, and in Senior it had been almost cicatrized, and would have left no greater marks in the liver, than those from which Mr Hawkins infers, that the disease in his case did not exist in the hepatic substance.

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* See a case by Dr Stocker in a paper on certain Tumours in the abdomen.—Trans. of the King's and Queen's College of Physicians.

In the following remarkable case, in which an abscess which had burst into the colon had undergone a spontaneous cure, and in which the patient died from another disease, similar appearances were observed by the intelligent surgeon to whom it occurred.

Case VII. (*February, 9th* 1814.)—James Billimere, aged 29, of a scrofulous habit, but remarkably healthy till the 4th July 1813, has since then been constantly ill with symptoms of dysentery and liver disease. He was seized yesterday with severe pain in the middle of the right thigh, which increased to such a degree that he cannot support himself on it. The thigh is slightly swollen in the middle and fore-part; pain is increased on pressure, and there is much unusual heat; there is no throbbing or change of colour, and there is no pain or tenderness in the upper part He has felt a slight pain in the upper part of the back. The pulse 84; the tongue clean.

On the 11th he was worse, and feverish symptoms had increased, the pulse being 120, full and hard, and his tongue loaded. The symptoms were alleviated by general and local bleeding, antimonial solution, with nitre, lotions, &c. On the 5th of March had pain only on moving the limb, no fever; bowels regular; and the swelling had increased in size,—the tumefaction gradually rising from the hip and knee to the centre, where it was hot and of a pale-red colour, while deep-seated fluctuation was perceptible. On the 8th, the fever had become severe, from the distension of the *fascia* to nearly four times its natural extent by the abscess, which pointed a little below the great trochanter, and at the middle and inner part of the thigh. Uneasiness of the back had increased, and his stools were green, hot, and scalding.

The abscess was opened at the former place, and twelve ounces of good purulent matter were discharged in a free current, with great relief to the patient, but without any diminution of the general swelling. On the 10th, a free opening was made in the middle of the thigh, and two quarts of thin purulent matter with several large curdy clots were evacuated; and next morning, three pints of matter flowed out with considerable force; and on the 12th, only a few ounces mixed with bloody sanies. A teasing purging of green slimy matter without the least pain continued, notwithstanding the use of chalk mixture and laudanum; and on the 12th he had much straining, and, on taking a drachm of salts, had copious evacuations of light-coloured fæces, with large quantities of matter mixed, and the stools of the same appearance. On the 13th, they were greenish and streaked with blood; pulse 118, full; cold sweats now less profuse. The discharge from the wound altered from a bloody sanies to a white serous fluid. Thigh easy, and nearly of its natural size; knee swelled and painful, and skin smooth and glistening. 21st, Stools usually slimy, whitish, streaked with blood and some green bile. The pulse continues quick; slept well last night; and this morning passed without pain a copious stool, apparently entirely composed of purulent matter. He has been taking since the 15th small doses of calomel and ipecacuan morning and evening, and infusion of ipecacuan in enemas, and by the mouth.

On the 22d, had four natural stools without any mixture of matter, and on the 24th, passed a stool of a pint and a half of pure purulent matter; sweats during the night. On the 25th, two natural stools without any purulent matter. A counter-opening was made in the situation of the original one in the thigh. He sweats constantly, and looks worse; takes no medicine, and has a pint of wine daily, and an anodyne morning and evening.

On the 26th, had a stool composed of purulent matter, others natural; had not been disturbed all night.

28th, Discharge from both openings in the thigh free, serous, without purulent matter or fetor; four stools, two of them of natural appearance, except being thin, the others consisted of six or eight ounces of pure purulent matter; and on the 27th, the stools were streaked with blood, and, being griped, he had salts, during the operation of which he passed considerable quantities of purulent matter. On the 12th April, after an uneasy night, had stools mixed with matter, blood and sanies, having been previously free from griping, and no purulent matter was noticed in the stools. Had oil, and passed natural stools. On the 14th, they were dark and bilious, and on the 15th, natural. The knee is very painful, swollen, red, and tender, and the irritation caused by it is very great. Fever in the evening, and sweats profusely from six P. M. Occasional rigors. On the 17th, an opening was made near the knee, and two ounces of matter evacuated from without the joint, the capsular ligament appearing to remain distended.

On the 20th and 22d, had several clay-coloured stools with a mixture of a chalky substance. On the 23d, stools were still white or cream-coloured, and voided easily, and in the urine there was a large quantity of sediment, as if bran were mixed with it. On the 24th, he was purged a good deal, one stool containing much matter; pulse 90; knee more swollen. From this time he passed no more matter by stool, and his bowels were pretty regular,—or costive, till the middle of May, when they were relaxed and the stools consisted of a mixture of bile and chalky substance; and as the exhaustion from the disease in the knee increased, he passed his stools, which were not very frequent, in bed. On the 14th May, had severe rigors, cold sweats, quick and feeble pulse, and fainting fits relieved by hot wine and water, fomentations, &c.; and the swelling of the knee subsided but increased in the ham; slept tolerably after this. On the 19th, the collection of matter in the knee burst, and discharged a pint of purulent matter, and was next day bloody and sanious. He died on the 31st.

Dissection.—Upon cutting down to the hip-joint, immediately in the situation of the abscess that had formed at the upper and outer part of the thigh, several sinuses with small collections of matter were found surrounding the hip-joint, the capsular ligament of which partook of the diseased action, and was much thickened One abscess ran upward about five inches among the *glutæi* muscles; it was very narrow, and contained a small quantity of glairy fluid; the cellular membrane forming the cyst was extremely thick, and in some parts cartilaginous. A similar sinus ran half way down the thigh, and appeared as if it had originally crossed at the anterior part of the thigh near the bone, and communicated with the middle large collection; but this had firmly coalesced, and no vacuum or any remains of cellular substance were perceptible. The hip-joint was sound internally, though the matter of the abscess was in immediate contact with the capsule, which was much ulcerated and thickened. There was no trace of communication with the pelvis, nor did any of the bones about these parts appear to be diseased. On cutting into the knee-joint at the anterior part, and raising the patella, the joint was found to contain a quantity of bloody grumous matter, extremely offensive, and communicated by a large opening with the parts in the ham, which were in a state of putrefaction; the crucial ligaments of the joint were destroyed, and the cartilage of the condyles of the femur and the head of the tibia was absorbed, except a small portion at the outer edge of each bone; the cartilage of the patella was soft and pulpy, and absorption of a part from the outer edge had taken place; a considerable portion of the back part of the condyles of the femur, and of the head of the tibia were also destroyed.

The liver adhered firmly to the ribs by a great number of strong filaments, and the colon was intimately united to the lower edge and concave surface of the right lobe, and also to the gall-bladder; and on careful dissection there appeared to have been a former communication between an abscess in this part of the liver and the colon, which latter was here much thickened and its cavity contracted. On cutting it open, there was an appearance of a cicatrix, and in that portion of the liver in contact with it, there was a cavity capable of containing three ounces, lined with membrane; but there was no appearance of purulent matter in this or any other part of the liver. The gall-bladder contained a large quantity of bile; the other parts of the liver and the colon were natural, and the stomach and intestines appeared unusually small. Upon a most careful search no traces of a former collection of purulent matter could be discovered in any other part of the abdomen.

The history of the cases of Senior and Burgess afford no support to the assertion of Dr O'Brien, that opening the abscess hastens the death of the patient by producing sanious discharge, —the purulent matter in Burgess's case having continued perfectly good from the 8th, when the abscess was opened, till the 17th, when the last portion was found to be a little watery; on the 24th it was again good, and it was not till the 20th day after the operation, that, after severe rigors, as in Dr O'Brien's case, the purulent matter became copious and dark-coloured. From these facts we may infer, that the change in the discharge did not arise from the access of air, but from a depraved state of the constitution and surface of the sore; and that when there are no other abscesses in the liver, and when the rest of its substance is healthy, as in this case, we may expect the matter to continue good and a cure to be effected, provided its extension has not destroyed too much of the substance of the viscus, or caused the death or caries of the bones, or destruction of other parts. I think it the more necessary to make these observations, as, my own cases having turned out unfavourably, they might be thought to countenance the erroneous rule laid down by Dr O'Brien and some other authors, while, in reality, they afford the strongest arguments in favour of operating at the earliest period, when it can be done, without danger of effusion into the abdomen. The division and death of the rib, caused by the pressure of the matter, shows how long the abscess had existed, and how injurious it is to defer the operation too long; and caries of the vertebræ at a distance from the abscess, and the formation of a secondary collection of purulent matter in the lungs caused by it, are singular circumstances, not likely often to confuse the diagnosis, but a less degree of which may lead to mistake. On the 7th of September, there was a sense of suffocation at the bottom of the throat and inability to speak, which deserves notice, as Dr Stocker has mentioned spasms of the throat as an effect of hepatic abscess opening into the bronchi, in which circumstances, however, I have not met with it. The pain to the left of the spine and the burning of the throat, complained of on the 16th and 22d October, were the only symptoms of the abscess in the left lobe which opened through the thickened coats of the stomach.

The sloughing of the edge of the wound commenced on the 2d of October, by inflammation and swelling over the diseased bone, and spread superficially, with gangrenous ulceration, so as to form a very extensive sore, like that in Senior's case, unrestrained by any kind of treatment, and evidently depending on the same cause. So frequent is this most distressing complication, that it may be looked on as one cause of the unfavourable termination of abscesses pointing externally, as it does not seem to occur in those opening into internal cavities, the vitality of the parts being greater, their vessels derived from distant sources, and their greater thinness admitting of the discharge of the matter before such extensive injury has been done to the surrounding parts; something is also to be ascribed to the purulent matter not remaining in contact with the edges of the openings.

The following remarkable case, in which I was consulted, resembles those recorded by Mr Hawkins even more closely; the abscess in the substance of the liver having caused sloughing of the peritoneal coat and abdominal parietes.

Case VIII.—A Field-officer, many years in India, and who had lived very freely, was admitted with a great swelling, like a child's head, in the epigastrium, extending nearly to the umbilicus; it was hard, except in the centre, where there was fluctuation and a violent arterial pulsation. The patient was early sensible of a fluttering in the side, and he was the first to detect the existence of fluid, the tumour having been at first hard, fixed, and insensible; he had been for some years subject to hepatic disease, and (according to report) to irregular action of the heart and arteries. He was on the sick-report only three weeks previous to his removal to this station in consequence of the march of his regiment; and early in his illness, the bleeding from four leeches produced collapse, from which he did not recover for eight hours. By my advice, an opening was made, from which fourteen ounces of reddish purulent matter, with thick diseased masses and sloughy membranes, were evacuated, the greater part of the latter remaining attached internally. The mind became confused, the wild ideas being of a pleasing kind and not constant. There was a purulent-like deposit in the urine, which, on drying, afforded crystals of a light pink-colour. He sank in a few days, sloughing of the parietes of the abdomen, round the wound, commencing in a leech-bite, having previously made some progress.

On inspecting the body, the abscess was found in the convex surface of the liver, which was attached to the diaphragm and anterior part of the peritoneum, and had pushed the stomach downwards and to the left side. The abscess in the substance of the liver was of moderate size, and contained good purulent matter, but a secondary collection of matter had formed within the adhesions, in which the peritoneum was found in a state of slough, protruding in shreds through the wound, the edges of which were gangrenous. The left lobe was hard, and contained tubercles; the gall-bladder contained good bile.

Two days after the operation, the left hypochondrium was raised considerably, either from the distension of the stomach or of the primary abscess. The pulsation, which led to fears of aneurism, subsided immediately on the evacuation of the matter. The appearance of the discharge gave rise to the belief that the substance of the liver was broken down in the abscess; but the dissection showed it to depend on the sloughing of the peritoneum, caused by the pressure of, and its being undermined by, the abscess; demonstrating the propriety of opening such tumours as soon as they are ascertained to have formed adhesions.

I have observed a state of the peritoneum nearly approaching to this, where no adhesions were formed between the liver and abdominal parietes.

Case IX.—James Salmon, aged 22, eleven months in India, admitted January 24th 1832, with bowel complaint, slight pain across the umbilicus; pulse 72, soft; stools green and mucous, with some drops of dark blood, and passed with straining. On the 27th, he had pain of right hypochondrium, and lay most easily on the left side. Leeches relieved the pain, and on the 3d February, he was discharged, evidently too soon, having passed blood two days before; and, accordingly, I afterwards found that he had been constantly purged in barracks till his readmission on the 13th of the same month, with disease too far gone to be under the influence of art. The pain of side now extended along the breast to the shoulder; he had severe headach; could not take a full breath; pain was increased on the slightest pressure; pulse 100, small and wiry; and the skin cold. He was immediately bled, without any relief; the blood was slightly buffy and cupped. On the 15th, the skin was clammy. On the 16th, there was a dark crust on the tongue, which was marked by sulci; stools fetid, with dark membranous-looking streaks on their surface; pulse 108; and he fainted when sixteen ounces of blood were taken away. On the 18th, he had pain at the bottom of the sternum, and starting from sleep, but no dyspnœa. On the 19th, profuse sweats. On the 20th, mercury was omitted. On the 21st, the countenance was anxious and depressed, and next day his mind wandered a little. He had been four times bled from the arm, and numerous leeches had been applied. During this time I had been confined to the house, and he was treated by a young friend only recently arrived in the country. From the account he gave me of the case, I had no doubt abscess had formed, and recommended the discontinuance of mercury and of the depletion. On the 25th, when I saw him, the ill effects of the treatment previously adopted were but too evident; his look was most ghastly; countenance wan and bloodless; lips blanched; nostrils contracted from collapse; mouth parched; and he appeared to be dying. There was a very copious white shreddy purulent-like deposit in his urine. He muttered, and had slight delirium, but he answered questions sensibly, and complained much of the profuse evacuations. There was fulness of the side, and general tumid belly, and he could bear no pressure for some way below the edge of the ribs. Wine and laudanum were given with the effect of prolonging life and procuring ease and sleep; but he died on the 1st of March.

Sectio Cadaveris.—Head.—Convolutions much separated; ventricles full of fluid, and much water at the base of the brain; choroid plexus very pale.

Thorax.—Adhesion of the left lung posteriorly; the lower lobe of right lung pushed upwards and backwards, so as to be concealed by the middle lobe, the diaphragm being pushed up to the fifth rib by the enlarged liver. The lower lobe dark, and slightly engorged, and firmly adherent to the diaphragm and middle lobe, and the adhesions contain water in their interstices and appear recent. The rest of the lungs very healthy; heart rather large, and right side full of blood.

Abdomen.—On the omentum, which was loaded with fat, being turned back, the liver was seen much enlarged, the right lobe occupying the epigastrium, and projecting two inches beyond the edge of the ribs. The stomach was distended and the pyloric extremity was pushed downwards; and the transverse arch of the colon was forced by it towards the left lumbar region, from which it took a sudden turn to the commencement of the descending colon, which retained its position in the left hypochondrium, the spleen being removed with the stomach to the right of it.

The colon was distended and the cæcum livid; the small intestines were natural. The liver contained an immense abscess in the most convex part of the right lobe, the parietes of which above were very thin, white, and apparently sloughy, and had formed no adhesions. The matter in the abscess was good, but at its bottom there was much sloughy membranous, and probably vascular tissue hanging loose in the cavity, but firmly attached to the substance of the viscus. Around the cavity, at a very little distance from it, the liver appeared pretty natural, though rather light-coloured. The anterior edge, which projected beyond the ribs, was dark, hard, cut with difficulty, emitting a peculiar sound, from hard points scattered in vast numbers through a cartilaginous substance. The left lobe was a little enlarged and light-coloured, and some small white marks on the surface were found to be caused by roundish substances, apparently formed of coagulated lymph; others were scattered through the substance of the lobe. There were some marks like cicatrices on the concave surface of the liver, but they did not enter into the substance of the viscus. Pale bile was found in the gall-bladder; ducts natural, but the pancreas and spleen were healthy.

The inner coat of the stomach was red, with a dark tinge, and the large veins were distended; the colon was not thickened, its inner coat throughout was studded with small round ulcers, radiated, and having hard bases; lymph was effused on the surface of a few, and there were some marks of others having healed. The remaining part of the mucous membrane was much reddened, with a dark colour in several places, especially on the right side.

It is needless to repeat the observations already made on the injurious effects of depletion and mercury, when the disease has proceeded so far as in this case; and on the fatal consequences certain to follow the premature discharge of patients recovering from dysentery and liver disease; especially where the presence of both affections indicate more deep-seated mischief, than the symptoms of either would lead us to expect. The unsupported membranes appear to have been killed over the abscess from want of nourishment, and from local irritation, rather than from the constitution being exhausted by profuse evacuations, as inflammation and adhesion of the lower part of the right lung was induced by the mechanical pressure of the liver, without any continuous sympathy or vascular connection with the original disease.

The great extent to which the lungs may be compressed by the presence of abscess in the liver, is illustrated by the following example which occurred to me, soon after the death of Salmon.

Case X.—A young man of colour, trumpeter to a cavalry regiment, was sent to the coast, labouring under chronic dysentery, and stricture of the rectum, consequent on an acute attack of that disease. He had evening fever, hot, dry skin in the day, and sweats at night, rapid and feeble pulse, and emaciation. The liver was found to be enlarged, protruding the ribs, and fluctuation was detected between the sixth and seventh rib. The chest sounded dull, and no respiratory murmur could be detected above the second rib, respiration being puerile on the left side, and below the clavicle on the right. The patient lay in bed inclined to the right side, as in Burgess's case. An opening was made between the ribs, although without any hope of ultimate recovery, and a great quantity of good matter was discharged, with great relief to the pain and general distress arising from distension, and the dyspnœa under which he previously laboured was removed, the functions of the right lung being restored, so that the respiratory murmur could now be heard below the fifth rib. The patient, however, sank under the profuse discharge, and his other complaints; inflammation and tendency to slough having previously shown itself in the edge of the wound.

The abscess was of great size, and had penetrated the diaphragm, which adhered to the side of the chest, leaving a large cavity between it and the costal pleura, and it was this secondary abscess that was opened. The lung was healthy. I was not allowed to examine the rest of the body.

The probable occurrence of abscess in the liver pointing externally through the diaphragm and parietes of the chest, had been previously suggested by the following case, in which the muscle adhered firmly to a considerable extent of the *pleura costalis.* It has other points of interest.

Case XI.—John Gill, a scrofulous-looking lad, four years in India, who had been transferred from the Horse to the Foot Artillery on account of delicacy of constitution, was admitted August 15, 1828, complaining of an attack of fever, coming on with rigors, at eleven P. M. for two days; and succeeded by severe pain in the right shoulder and in the right lumbar region, extending up under the ribs, and increased by very slight pressure, on attempting full inspiration and on moving in bed. The urine was high-coloured, and the tongue was white. He lay on the left side; and the pulse was 84 and hard; but on being bled to sixteen ounces, which appeared natural, it became small and increased in frequency. Twenty leeches were applied next day, and the side was greatly relieved, and, with the exception of a slight febrile paroxysm on the night of the 16th, he felt himself easy, except occasionally, and on motion and full inspiration; the pulse was also of the usual frequency, and the urine natural. His bowels had been freely opened by calomel at night, and purging draughts in the morning; but on the 20th stools were frequent, of greenish slime, and latterly very dark-coloured; and the pain of the side increased, and was most complained of at the margins of the ribs. The pulse was 80 and full, and the skin warm and dry.

He was bled to sixteen ounces; blood natural. He had a scruple of calomel in the morning, and ten grains with the same quantity of ipecacuan in the evening. The fever left him in the night; the pulse became natural, and the bowels easy, but the pain continued much as before; the skin was hot in the evenings, with some acceleration of the pulse; and he had occasional griping and slight tenesmus, with dark-coloured slimy stools, several times tinged with blood. They were sometimes green-coloured.

He took 78 grains of calomel between the 15th and 23d August, for the most part followed by purgatives, and the mouth got tender; but although he took 168 grains combined with antimony or ipecacuan, and used mercurial frictions twice a-day, between that date and the 9th September, the soreness of the mouth, previously induced, had disappeared. Mercury was given in small quantities for some time longer, but without any sensible effect, the rapid changes in the state of the evacuations and the griping, appearing to be unconnected with its use. The pain gradually became slight, and was afterwards only felt at intervals; the pulse was usually about 70, although the skin was sometimes dry, and there was slight excitement when the bowels were irritable; he had no fever or sweats.

On the 13th, he complained a good deal of pain, and had twenty leeches applied with temporary relief.

On the 16th could lie on neither side, and on the 18th had profuse sweats all night, although he slept well. He could bear pressure over the false ribs; the tongue was brown; pain continued to recur at intervals, but the pulse seldom rose above 60, till the 8th October when it was 84, and the pain of the side was increased, and, as usual, relieved for a time by a blister.

During the rest of October and the first week of November, he complained only once or twice of the pain of his side or shoulder; the pulse was 60 or 70, and soft; the tongue nearly natural; and the bowels often costive, and he slept well; but did not regain flesh or strength, and had occasional undefined uneasy feelings about the side.

On the 11th, he was attacked with severe pain along the margins of the right false ribs, and could not bear pressure, or full inspiration; the skin was hot, followed by sweating, and the pulse was quick; the pain was much relieved by a few leeches and a blister. He had now afternoon fever, anxiety of countenance, much pain, especially in the lumbar region, and increase of debility; and on the 16th he complained of cough, which, he said, came from the right side, and pained him severely. Bowels were costive, and he asked for blisters.

On the 24th he complained more of debility. There was redness of the skin over the sacrum; he sweated at night, and his arms were painful.

On the 26th, the false ribs of the right side were observed to protrude, and fluctuation was perceptible between the ninth and tenth and eleventh and twelfth ribs,—the pain having subsided; but on pressing on the part where the fluctuation was, he felt deep-seated pain; and on the 29th, complained of pain along the edge of the ribs. Bowels full and tense, which he ascribed to constipation; return of strangury, to which he was long subject; the pulse was 104; the tongue brown; yet he rested well from an anodyne draught.

On the 30th, the skin was very tender over the ribs, and also on the upper part of the right lumbar and umbilical regions, where a defined hard swelling could be felt.

On the 1st December, he had uneasiness in the left hypochondrium. Took nothing but wine. An opening was made with an abscess-lancet between the tenth and eleventh ribs, near their angles, and a large quantity of thick and good matter was evacuated. His pulse got small, and it was not thought advisable to solicit by change of posture the discharge of the rest. He had a draught, and rested well.

On the 2d, had some pain of left side and right lumbar region; he felt more easy after the removal of the tent admitted of the free discharge of the matter; the pulse was very small, and the lips bloodless.

On the 3d, he felt easier, was able to turn himself in bed; the pulse was 96, and fuller; and he eat with appetite, and sweated less; but during that night there was some wandering and delirium.

On the 4th, had much pain round the margin of the ribs and in the shoulder.

On the 5th, the pulse was very small, the debility extreme, and he had distressing cough, and much difficulty in bringing up a thick mucous or blackish matter. No wandering. Free discharge from the wound of thin serum mixed with the purulent matter.

On the 6th, pulse was only 74 and stronger, and he rested well and ate his food; tongue brown; little cough, and he took a full inspiration without pain.

On the 7th, there was free discharge after introducing a probe several times, the first part thin and fœtid; pulse 80; one large pretty good stool.

On the 8th, he complained of want of sleep and a good deal of coughing, and of oppression about the heart.

On the 10th, his skin was bathed in perspiration; pulse 76, very small, and he appeared to be sinking. In the evening, there was great oppression at the heart, and he cried out for a strong anodyne draught. He died the same evening.

Dissection.—Much water in the pericardium and both pleuræ. Lungs healthy in structure, but pale; the right one slightly adherent to the diaphragm, but on being separated by the finger, its membranous covering was smooth and unchanged. The diaphragm adhered for a considerable extent to the right *pleura costalis*, having been pushed against it by the abscess. On cutting through the abdominal muscles from the umbilicus to the right loin, the abscess was opened, and its parietes found to be formed of the diaphragm alone, of the false ribs which were quite denuded near the wound, of the spine behind, and below, and in front by the muscles of the lumbar and umbilical regions. Almost the whole of the right lobe of the liver was destroyed; the remaining part was rather softer and darker than natural, but was little diseased. The gall-bladder contained some bile. In the cavity of the abscess there was a good deal of very thick matter, some of which adhered to its sides, which had in some points a membranous cellular appearance, without any sign of granulating. The stomach and colon were healthy externally, and only a few small ulcers were detected on the mucous membrane of the ascending colon; but, the body being about to be removed, time was not afforded for more minute examination.

Pain on slight pressure when fixed, or when it returns to the same spot, especially in the lumbar region or between the ribs, is a serious symptom, and, when accompanied by emaciation and evening fever, however slight or irregular, will be too often found to be caused by the formation of adhesions or abscess. When the tenderness arises from rheumatism or from sympathetic affection of the muscles from mere disorder of the functions of the liver, it is for the most part transitory, diffused and seldom fixed in the same spot, and, when from the latter cause, is never severe. This symptom and the want of power to sustain a slight evacuation, indicated by the weakness and increased frequency of the pulse after the abstraction of sixteen ounces of blood, sufficiently indicated the serious nature of the disease, and the necessity of great caution in the employment of depletion, and should have led to the omission of mercurials at an earlier period.* The rigors and paroxysms of fever previous to admission probably depended on the formation of matter; but in places where fever is prevalent, these symptoms are of very little practical use.

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* It would be wrong to omit to mention, that this patient's general appearance was little affected for a considerable time after his admission, and that for some time I almost suspected that the hepatic symptoms were complained of to avoid the performance of duties, which his constitutional weakness rendered painful to him.

The long period during which the abscess remained in a latent state, and without at all affecting the pulse, is remarkable; but its extension and injury of the neighbouring parts, shows how necessary it is to take the earliest opportunity of operating, more especially where the matter can be felt between the ribs, as, from the great thickness of the parts through which it has to make its way, there is little risk of adhesions not having taken place. It will too often have already caused the destruction of great part of the liver, and, as in this case and that of Burgess, denudation and death of the ribs, rendering recovery hopeless. Mr Annesley directs an abscess of the liver pointing externally to be laid completely open, and its cavity to be filled with lint. But where the matter presents itself between the ribs, and the opening is necessarily limited by the bones, and, even when large, is often closed by the motion of the parts, this plan is not only ineligible, but impracticable: and even in a case similar to the successful example published by him, I believe the extensive incision necessary to lay open an abscess of any extent, would be attended with no advantage equivalent to the risk of cutting the peritoneum beyond the adhesions, and the consequent effusion of purulent matter into the abdomen. This will be illustrated by the following case, in which the operation was too long delayed, in consequence of the unfortunate result of three other cases previously operated on, and the opinions of some authors having led to a hope that a more favourable termination would follow a spontaneous opening into the colon, thus affording abundant time for the formation of adhesion.

Case XII.—Francis Taylor was admitted on 12th May 1830 into the hospital of the 1st Battalion of Artillery, Nogpore, complaining of dull pain with sense of weight in the centre of the epigastrium, increased on pressure, on full inspiration, and attempting to lie on the left side. He was discharged from the hospital on the 6th, apparently cured of a slight attack of dysentery, which yielded very easily to simple remedies, but has felt this dull pain for the six days subsequent to leaving the hospital. He has been subject to bowel complaint; stools sometimes dark, at other times yellow or slimy; pulse 100, strong; tongue yellow; much thirst; skin soft; sighs deeply every few minutes. He was bled to twenty-four ounces on admission, and again to the same extent on the 17th, and had seventy leeches appled previous to the evening of the 19th with slight temporary relief. The blood was natural, except that the quantity of serum was unusually small.

When such injurious suspicions are confined to the breast of the surgeon, and only lead to more minute observation of the symptoms, they may be excused; but I fear that they too often are the cause of injustice to the sick soldier, and of loss of confidence in the skill of the physician.

19*th* (*vespere.*) At 11 A. M., the pain increased, and shifted to the left hypochondrium, and in an hour returned to the epigastrium, with increased violence; and it is now worse than it has yet been, and he cannot bear the slightest pressure. Pulse 96, firm and hard. Gums are tender from fifty grains of calomel, and the use of eight drachms of mercurial ointment. He is bled to thirty-six ounces, which caused fainting, and is now bathed in cold perspiration, and the pulse is feeble. Slight relief to pain.—*Habeat H. S. Calomel.* ℈i.

20*th.* Pain still severe in epigastrium. Pulse full and hard.—*Admoveantur parti dolenti Hirudines* xxxvi. *et postea emplast. vesicator. Capiat Calomel.* gr. iii. *Pulv. Ipecac.* gr. ii. 2*da quaque horâ. Contin. frictio cum Unguento Hydr.*

22*d.* After the blister rose he felt easier, and now complains only of pain on full inspiration. Pulse 104, bounding and compressible; mouth sorer, and runs a little. The ointment to be omitted; the pills continued three times a day, and thirty drops of tincture of digitalis to be given thrice daily.

On the 25th, he had little pain; the pulse was 100, bounding and weak; and the medicine was omitted. The stomach was irritable.

On the 26th, he complained more of pain, and a hard defined swelling was detected in the right side of the epigastric region, seeming to extend deeply. Pressure on the swelling caused pain, but the sensation did not extend beyond the swelling, as is usual when a considerable collection of matter has taken place. Had not tasted food for some days, and he could only retain water on the stomach, as when mixed even with milk, it was rejected. Mouth had ceased to run; sweated, and had thirst, and a frequent, sharp, compressible pulse, a yellow, slightly furred tongue, and he passed fœtid green stools. On the 29th, the swelling was found to have increased, and it pulsated strongly at each beat of the heart; and the tenderness and pain were increased in severity, and extended farther to the right side, and under the ribs, with oppression of the breathing. The treatment was now confined to warm-baths, (which gave great temporary relief, and procured sleep,) poultices, anodynes, laxatives, &c. His stomach continued to refuse food, except in very small quantity; the bowels were irritable, the stools contained much mucus, with a small quantity of purulent-like fluid. He had also pain about the umbilicus, which was relieved by a blister. On the 7th June, fluctuation was perceived in the swelling, and the tumour was larger, but seemed to vary slightly in size. He felt most easy when lying on the side with his legs drawn up, but he could not remain long on the left. On the 11th, the pulse was 92, very feeble, the strokes being sudden, and not quite regular; but his respiration was now easy; pulsation was felt in the tumour below the margins of the ribs. The stools were bulky, light-coloured, and fœtid.

Although he enjoyed some intervals of comparative ease, the swelling gradually increased in size, and became more painful, and very tender at the most prominent part, with great distress, and inability to take food; and on the 17th, had fœtid greasy stools, with griping close to the tumour, a sensation of oppression at epigastrium, and as if what he drank distended the swelling.

On the 23d, the swelling was opened at the most prominent point, and eight ounces of good matter were evacuated. The probe could not be passed deeply, but entered nearly two inches to the left side. The puncture is three finger-breadths from the angles of the false ribs. The operation relieved the oppression at the stomach, and he felt very easy; but coagulated blood appeared in the stools, which were thin and brownish. He continued to sweat; and his pulse was 96. On the 26th, he was worse, and the stools were very frequent, containing a white matter like pus, passed without pain or straining. They became more frequent, and latterly were principally composed of blood, passed in bed. On the 30th, when there was great fetor of the body, the discharge from the abscess was good and moderate in quantity, but the edges of the wound showed a tendency to inflammation and gangrene.

Died at 7 P. M., July 1st, quite sensible till within a few minutes of his death.

Dissection.—The liver was much enlarged, and its anterior edge covered the stomach anteriorly. The abscess was small, and confined to the right part of the anterior edge of the right lobe, and it was not attached to the parietes except immediately round the puncture. The surface of the abscess was cartilaginous to the feel. The left lobe attached to the right near the abscess, and its convex surface very firmly united to the diaphragm opposite the heart. The right lobe was enlarged, and a few very small abscesses were scattered in different parts of its substance; its structure generally was healthy, and there was very slight adhesion to the stomach and colon. The stomach was healthy, and contained a black fluid. The right colon was thickened, livid, and its mucous membrane extensively ulcerated, its middle part bent down, and adherent to the cœcum. The transverse colon was tolerably healthy externally; there were minute ulcers in its inner coat. The left colon was thickened and ulcerated, but less so than the right. The upper part of the rectum was less diseased, the lower part very much ulcerated, and presented some marks of what appeared to be healed ulcers. The pericardium was distended with a large quantity of clear serum; all the other viscera were healthy.

The adhesions in this case extended a very little way from the opening made by the abscess lancet, and had the attempt been made to lay open its cavity in its whole extent, in order to fill it with charpie, as recommended by Mr Annesley, the abdominal cavity would have been laid open, and the fair prospect of a cure, which would have been afforded by a simple evacuation of the matter, had there been no other disease than the abscess, would have been destroyed. Mr Hawkins thinks, that the fear of adhesion not having formed when abscess of the liver appears externally, deserves little consideration; but my own experience has furnished me with several striking examples in which fluctuation was very perceptible, without adhesion having taken place, or the matter being in contact with the abdominal parietes, and in three instances the tumour was defined, somewhat pointed, soft in the centre, and surrounded by a hard margin, and in one of these cases, the skin over the external swelling was covered with enlarged and tortuous veins, such as often cover deep-seated abscess of the breast and other parts. One of these cases is that of M'Donald, already referred to, in which an incision was made through the integuments and muscles over the swelling, with the view of promoting adhesion, (as recommended by Dr Graves,) but without effect.[*]

The consideration of abscesses of the liver opening into the lungs and intestines present so many points of interest, that their consideration must be reserved for another opportunity.

ART. V.—*Historical Notices on the occurrence of Inflammatory Affections of the Internal Organs after External Injuries and Surgical Operations.* By WILLIAM THOMSON, M. D., Fellow of the Royal Colleges of Physicians and Surgeons.

> "Præter locum vulneratum, totum corpus examinandum extus et intus, num non adsit alia causa mortem inferens, quæ dubiam lethalitatem vulneris faciat."—DE GORTER, Chirurgia Repurgata, §. 1200.

[THE attention of the writer was first directed in a particular manner to the occurrence of internal inflammatory affections after local injuries and surgical operations, by some cases of this nature which occurred under the care of MM. Janson and Mortier, at the Hotel-Dieu of Lyons, during his attendance at that hospital in the latter part of 1823. The following notices were prepared in the winter of 1824–25, with a view to being used for a Probationary Essay, or Inaugural Dissertation. Circumstances occurred to interfere with that intention, and they were placed by the writer in the hands of his late friend Professor Turner, where they remained till the time of his death in 1835. Since the period when these notices were drawn up, the subject to which they relate has excited a large share of attention; numerous essays have been published upon it, both in France and in this country, in which a large body of additional facts has been recorded, and many of the authorities quoted in these notices have been referred to: but in none of these essays does the writer find that the purpose which he had in view, that, viz. of giving a continuous narrative of the literary history of this interesting portion of surgical science, has been fulfilled. He is induced, therefore, to hope that, even at the present day, the following communication may be not without interest.]

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[*] When the skin is red at the most prominent point, no danger need be apprehended. An American author has published some cases in which he punctured hepatic abscesses, and finding no adhesions, stitched the liver to the side; and even recommends the practice to be adopted whenever fluctuation is discoverable. It is needless to object to such barbarous practice; but the cases show, that the fear of opening such abscesses previous to adhesion having taken place, is far from imaginary.—See the American Quarterly Journal of Medical Science.—Mr Hawkins's practice of introducing a fine needle into the swelling is deserving of imitation in all doubtful cases.

In attempting to bring into one continuous view the observations of practical surgeons relative to the occurrence of inflammatory affections of the internal organs after external injuries and surgical operations, I propose to notice, *first*, the occurrence of affections of the liver in cases of injury of the head; *second*, the occurrence of affections of other viscera and parts of the body, besides the liver, after injuries of the head; *third*, the occurrence of affections of the liver, and also of the other viscera and parts of the body in injuries of other parts than the head; and *lastly*, the occurrence of affections of the different viscera and parts of the body subsequently to surgical operations.

I.—*Inflammatory Affections of the Liver in cases of Injury of the Head.*

Even at so early a period of modern surgery as in the time of Ambrose Parè, (whose works were first published in 1561,) the occurrence of abscesses of the liver in cases of injuries of the head had attracted the observation of surgeons. " It is," Parè remarks, " to be observed, that abscess of the liver is frequently excited in cases of wounds of the cranium,—an occurrence which has lately been observed by myself, by Robert Greaume, Rector of the Medical Faculty of Paris, and by Binosque, a licensed surgeon, in three instances." (Œuvres, Lib. x. Cap. xii. p. 229, edit. Lyons, folio, 1652.) Parè particularly insists upon the fact, that the individuals who were the subjects of these observations were in perfect health previously to the reception of the injury of the head. " Et si tu m'objectes," says he, " que telle aposteme estoit ja concretée auparauant le coup donné; je respons que les patiens, auparauant estre blessez, auoient une viue et naturelle couleur sans aucun signe d'estre hepatiques, et estoient bien habituez, faisans toutes leurs operations, ce que tu pourras voir par experience y prenant garde comme i'ay fait."

Since the time of Parè, the connection between injuries of the head and abscesses of the liver has been pointed out by a number of surgeons. Pierre Pigray, the pupil of Parè, whose *Chirurgia* was published at Paris in 1609, says, (in the ninth chapter of the fourth book,) that he has seen many persons who had been wounded on the head die without the occurrence of any alarming symptoms, particularly when fever occurred on the third day; and that, in almost all these fatal cases, he has found an abscess in the substance of the liver, (p. 368–9.) (Epitome des Preceptes de Medecine et Chirurgie, Rouen, 1658.)

Ballonius, in the appendix to his Treatise on Convulsions, (the *Approbatio* of which is dated 1638—Opera, Vol i. p. 368,) says, that he has heard that many surgeons have observed abscesses in the concave part of the livers of individuals dying in consequence of severe injuries of the head, but as to the truth of this he cannot himself offer any judgment.

Schenckius, in his Exercitationes Anatomicæ, (published in 4to at Jena in 1662, p. 177,) states, that Virsungus had found from the examination of many bodies, that abscess of the liver is very liable to occur in individuals who have received severe wounds of the head, particularly of the temporal muscle.

Petrus de Marchettis, Professor of Anatomy and Surgery at Padua, mentions, in his work entitled "Observationum Medico-Chirurgicarum rariorum Sylloge," (p. 35, edit. Amsterdam, 1665,) that he had frequently demonstrated both in the anatomical theatre, and in the Hospital of St Francis, large collections of pus in the cavities of the thorax and abdomen, and abscesses in the lungs, liver, and spleen, in individuals dying after injury of the head.

We are told by Phil. Jac. Sachs, in the Miscellanea Medico-Physica Curiosa for 1671, (Dec. i. An. ii. Obs. 119,) that he had been informed by Dn Stadlender, that in at least three cases of injury of the head, he had found abscesses in the liver. In one of these cases,—viz. that of an individual, a portion of whose brain escaped by a wound in the *os frontis* above the left eye, and who died on the 14th day,—it is mentioned, that, eight days before death, the abundant secretion of pus from the wounds entirely disappeared.

It is stated by Velschius, in his "Episagma Observationum Medicarum" (observ. 56,) that Paulus Marquardus Slegelius, (born at Hamburgh, 1605,) had observed all those who died of wounds of the head to complain, before death, of pain of the spleen or liver, and he had always found, on opening their bodies, abscess of the liver.

Schenckius, in his "Observationes Medicæ Rariores," (folio, 1665, p 411,) has quoted, "ex Thomæ Mermanni sereniss. Bavariæ ducis Archiatri Observationibus lectissimis,"* the case of an individual who, some months after having narrowly recovered from the effects of a severe wound of the head, fell into bad health. When Mermann was called to see him, he found him affected with jaundice, with slow fever, delirium, and wasting of the whole body, and on examining with his hand the region of the liver, he discovered that it was swollen and painful. After the death of the individual, no mark of disease was found in the head. The substance of the liver was almost wholly destroyed, and in place of it, there was found a quantity of putrid and purulent matter inclosed in a sac.

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* I do not know whether Schenckius refers to Mermann's Consultationes et Responsiones Medicæ, which were published by Thiermair at Ingolstadt, in folio, in 1675. Mermann himself died in 1612.

The second chapter of Meekren's Observationes Medico-Chirurgicæ, (Amsterdam, 1682,) is entitled "De abscessu hepatis fracturam cranii secuto." Meekren relates a case of this kind which had occurred to himself (p. 22, and again more minutely, p. 31). The individual, about twenty years of age, had received three wounds on the skull, one of which required the application of the trepan. On the 20th day, he was quite free from any symptom of fracture of the cranium. He then began to complain of pain in the region of the liver and stomach. The copious purulent secretion in the wound diminished much in quantity, and the bottom and lips of the wound became dry; violent fever and delirium came on, and he died on the 28th day. A small quantity of pus was found upon the *dura mater* below one of the wounds on the skull, and serum was effused at the basis of the brain. An abscess was found in the liver containing half a-pint of pus.

Bonetus, in the fourth book of his Sepulchretum Anatomicum, (first published in 1679,) section 3, observation 16, entitled "Hepatis Abscessus in capite vulneratis non raro repertus;" and C. Stalpartius van der Wiel in his "Observationum rariorum centuriæ posterioris pars prior," observ. 3, (first published in 1687,) have collected most of the authorities on this subject to which I have hitherto referred. Some errors have crept into the quotations given by Bonetus from Ambrose Parè, Slegelius, and Ballonius, which have been pointed out by the learned and accurate Morgagni in the 22d paragraph of his 51st epistle.

Pacchioni, in his Opusculum Anatomicum de Dura Meninge, (Romæ, 1721), has related (Opera, p. 63,) two cases of injury of the head. In one of these, occasioned by a fall, the individual seemed to recover from the primary effects of the injury in a few days. Soon afterwards, however, slow fever came on, with acute pain in the region of the liver. On the fifteenth day, the trepan was applied, but only a few drops of pus escaped. Jaundice occurred on the sixteenth, and he died after repeated fits of shivering. Both tables of the cranium were found to be fractured at the place of the injury; the *dura mater* was externally semiputrid and livid. The brain and chest seemed quite healthy. The liver was immensely enlarged, of a dirty-black colour on its outer surface, where there were seen some tubercles "tartaro plena." The substance of the liver contained an abscess full of blood and pus. The gall-bladder was full of a bloody substance, and its membranes much thickened.

In Pacchioni's second case, the patient, a man 70 years of age, who had received a wound on the occiput, reached the eightieth day, without the occurrence of any bad symptom. The surgeon having attempted to remove a piece of bone that was sticking to the ***dura mater***, the patient was suddenly seized with universal collapse and coldness of the different parts of his body; cold sweat, imperceptible pulse and pain in the intestines. There subsequently occurred pain in the right hypochondrium, and bilious vomiting, and he died on the third day of the attack. At the place of the wound, the ***dura mater*** was somewhat thickened on its outer surface, and a little serum was effused between it and the ***pia mater***. The thorax was healthy. There was an abscess in the liver, which had burst and discharged its contents into the cavity of the abdomen.

The second part of the Breslaw Collections for 1724 contains (p. 430) some remarks upon the Sympathy of the Liver with the external organs, by Behrens of Brunswick. He relates a case of injury of the head that was followed by the formation of nine abscesses in the liver.

Bianchi, in his Historia Hepatica, (Geneva, 1725), alludes (p. 147,) to the occurrence of abscess of the liver after injuries of the head, with effusion below the cranium, as a well-known fact; and he mentions a case, which had fallen under his own notice, in which an abscess of the size of the fist was found in the liver of an individual dying two months after the reception of an injury of the head. At another part of the same work (p. 360,) he mentions that he had been informed by his colleague, Antonius Reina, that at the siege of Turin he had seen many become affected with abscesses of the liver after injuries of the head; and that in cases of severe contusions from mortar-shells, though unaccompanied with laceration, these abscesses occurred before the acute stage of the disease was over, and hurried on the death of the patient.

We are informed in the last of "Tres historiæ medicæ," recorded in the first part of the second volume of the Commentarii Bononienses for 1745, that Molinelli, who was Professor of Medicine and Surgery at Bologna, having had his attention particularly directed to the occurrence of abscesses of the liver, after injuries of the head, examined the bodies of a number of individuals who had died of such injuries. The results of his examinations were, that these abscesses occur in the convex as frequently as in the concave part of the liver, and that the matter sometimes stagnates in other parts of the body, the liver remaining sound; but it is always, he alleges, in some part of the abdomen that this takes place. In one remarkable case of injury of the head, in which the abdomen began to swell at the same time that the process of suppuration ceased on the external wound, he found the surface of the intestines, particularly of the small ones, covered here and there with small ulcers, and a great number of tubercles. In some individuals dying of injuries of the head, a considerable time after their reception, the liver and other viscera were found quite healthy. On the other hand, in individuals who had received wounds, or who had ulcers, on other parts of the body than the head, he found collections of purulent matter in the liver.

M. J. L. Petit mentions in regard to the wounds of the head which he had occasion to see at Courtray, when along with the army, that in all the cases of erysipelatous inflammation following on such wounds, in which suppuration did not take place, the patients died. In these individuals the wounds became dry ; their borders were flabby. No mark of disease was found within the cavity of the cranium, not even below or opposite to the wound ; but on examining the liver, inflammation and abscess were constantly found there—an accident, he remarks, pretty frequent in wounds, particularly those of the head.—Traitè des Malad. Chirurg. i. 45.

In the 9th volume of the 12mo edition of the Memoires de l'Acad. de Chir. 1757, p. 130, there is an Essay by M. Bertrandi, Professor of Surgery at Turin, published both in French and in Latin, the latter copy being entitled " De Hep. Absc. qui vulneribus cap. superveniunt." Bertrandi states that he had observed in cases of injury of the head, abscesses to form both on the surface and in the substance of the liver. He likewise states that he has seen persons who seemed to have entirely recovered from wounds which they had received on the head, and who, on account of some derangements in the animal functions, had passed under the care of a physician, become yellow, be affected with difficulty of breathing, with or without pain, void brick-coloured urine and purulent dejections, and, after these symptoms had continued for some months, die in a state of exhaustion and marasmus. In these cases he has never found on examination after death any change of structure besides suppuration of the liver.

Mr Batting, in his Chirurgical Facts relating to Wounds and Contusions of the Head, &c. Oxford, 1760, has published a case (Observation ix. p. 46,) of contusion of the head with separation of the lambdoid suture, which was succeeded by a suppuration of the liver. The patient was seized on the 10th day after the injury with cold shiverings, succeeded by fever and great pain in the head, and died six days afterwards. A portion of *dura mater*, at some distance from the external wound, was inflamed and tending to putrefaction.

M. Richard de Hautesierck, in the sixth chapter of his Recueil d'Observations (4to, Paris, 1772), remarks (Vol. ii. p. 329), that in injuries of the head, particularly when accompanied by effusion, the liver, being sympathetically affected, often becomes inflamed, and sometimes suppurates, and seems always to have participated in the violence of the commotion. He has related a case furnished to him by M. Betheder, of a woman who, having fallen on her head, suffered great pain in that region, and, on the following day, in the left shoulder also. The pain in the left shoulder passed soon to that of the other side; she gradually became yellow, and suffered from nausea and bilious vomiting; but these symptoms disappeared under the use of purgative medicines. This case, M. Hautesierck observes, proves that though the liver frequently becomes diseased in cases of wounds of the head, the suppuration of this viscus is not a necessary effect; that it does not happen in all cases, and that it is frequently replaced by a less dangerous jaundice.

In another case of fall on the head, which is related in the same work, by M. Vernueil, (p. 354,) the symptoms seemed to be subdued by the remedies employed, when, after some imprudence in respect to regimen committed by the patient, " la fievre se mit de la partie," manifest symptoms of inflammation of the chest showed themselves, accompanied with delirium, lethargy, and a dull pain in the region of the liver. The patient died on the fourth day of this attack. No effusion was found within the cranium, but suppuration had occurred in the lung, which was adherent to the pleura, and in the liver. It is remarked that this individual's lungs had previously been very delicate.

The only case I can find in Mr Dease's Observations on Wounds of the Head, (Dublin, 1776,) in which there is reason to presume that an affection of the liver had occurred, is the eighth, in which the patient, who had frequent shiverings both previously and subsequently to the application of the trepan on the nineteenth day, became all over yellow, as if jaundiced, and died on the twenty-second day. But no notice is taken, in the dissection, of the state of any parts besides the contents of the cranium.

M. Quesnay, in his " Observations sur le Trepan dans les cas douteux," (contained in the first volume of the Memoirs of the Academy of Surgery,) has related one case of injury of the head in which an abscess formed in the liver, (p. 322, 12mo edition.) In this case there occurred hemorrhage from the nose and ears, on account of which very active blood-letting was practised. On the seventh day, the patient was seized with bilious vomiting and fever, but this diminished under the repetition of venesection. On the eleventh day, in consequence of great pain of head, deep, but interrupted stupor, and irregular shiverings, the trepan was applied, and a spoonful of blood, extravasated below the *dura mater*, was evacuated. Repeated venesection (once from the foot) was practised; but pungent pain in the right hypochondrium supervened, and fever followed by irregular shiverings, which led to the suspicion of abscess of the liver. The patient fell into a state of lethargic stupor, and died on the seventeenth day. An abscess was found in the substance of the large lobe of the liver.

In the sixth volume of Richter's Chirurgische Bibliothek, (1782, p. 722,) is related a case of abscess of the liver, supervening to a wound of the head, by Dr Michaelis of New York. In this case, the operation of trepan. was performed on the nineteenth day after the reception of the injury, the patient having followed his usual occupations during most of the intervening time, notwithstanding violent pains below the seat of the injury. A portion of the inner table of the skull was found detached and lying on the *dura mater*, for the removal of which and other splinters, the trepan was repeatedly applied. On the eleventh day after the operation, he had an attack of tertian fever, which yielded, within fourteen days, to the ordinary means. In the fifth week, he was seized with a stitch in the side, which was removed by bleeding and blistering. But in the sixth week, a painful swelling in the region of the liver showed itself, soon followed by fluctuation. On this swelling being opened, more than a pint of purulent matter was discharged. Nothing remarkable occurred in the progress of cure.

I do not find that Mr Pott, in his "Observations on the Nature and consequences of those Injuries to which the Head is liable from external violence," nor Mr Abernethy, in his "Surgical Observations on Injuries of the Head," make any allusion to the occurrence of abscesses of the liver. Their dissections, indeed, never extend beyond the cranium. In "Some histories of wounds of the head, by John Williams of Redruth in Cornwall, (Falmouth 1765,)" there seems to be no mention of hepatic symptoms or affections, and Mr Samuel Cooper in his First Lines, (i. 397,) after referring to cases of this kind recorded by foreign surgeons, remarks, that "inflammation and abscesses of the liver, in consequence of injuries of the head, have not been so often noticed in this country."

Having sufficiently established, by a reference to authorities, the fact, that the liver frequently inflames and suppurates in cases of injury of the head, it will be proper to take some view of the explanations of this phenomenon which have at different times been proposed.

The explanation offered by Ambrose Parè need not detain us long. Nature, according to him, offended by the great severity of the blow, withdraws her powers and virtues, viz. the blood and spirits, from all parts of the body to the heart and liver, in the latter of which viscera, they, in consequence of their superabundance, excite fever and phlegmonous abscess. " La cause de ce peut estre que nature se sentant offensée par grande vehemence du coup, collige et retire a son secours ses forces et vertus de toutes les parties du corps (qui sont le sang et les esprits) vers le cœur et le foye : ainsi que voyons en peur et crainte, e adoncques fait inflammation au foye, &c. Ou si tu aimes mieux dire auec Monsieur de la Corde, que nature succumbant sous le faix du mal vient a renuoyer une partie de ceste matiere purulente auec le moins d'incommoditè qu'il se peut au foye par les veines : et qu' ainsi soit, tous ceux ausquels une aposteme se fait au foye le cerveau blessé, meurent."—Ambrose Parè, Œuvres, Lib. xvi. chap. xii. folio edit. Lyons, 1652, p. 229.

Pigray attributes the formation of abscesses in the liver and mesentery, in cases of wounds of the head, to the sympathy and association of parts, on account of the nerve coming from the sixth conjugaison. If the abscess be in the mesentery, it may be discharged by the intestines ; if in the liver, it produces continued fever and death.

Ballonius, though he does not seem to have been quite sure whether the phenomenon ever actually takes place, thought that in case it does, he could furnish an explanation of it. He rejected the opinion of some, that the pus spreads from the brain to the liver by continuity of membrane ; and, taking for the foundation of his theory the observation of Galen, that, in injuries of the brain and its membranes, the secretion of bile is greatly increased, he concluded, that, if the evacuation of this increased quantity of bile be obstructed, it will stagnate in the concave part of the liver, and there produce inflammation and abscess. He deduces as a practical rule, from this theory, the propriety of administering purgatives in cases of injury of the head, to carry off the superabundant bile.

" Observavi sæpissime," says de Marchettis, " quod quando in his vulneribus (capitis,) collum incipit dolere, parte potissimum postica, et laterali, tunc materia purulenta delabitur ad thoracis et abdominis cavitatem, quæ longiori mora cum pulmones, tum pleuram, aliquas nempe ipsorum partes erodit, ex quibus multa sanies emanat, quæ postmodum ad abdomen defluit, cum jecoris et lienis labe, in quibus varias pustulas excitat ; quibus disruptis, perinde ac ex pulmonibus, et pleura, ita et ex his materia purulenta effluit ; quanquam hujus observationis ignari, existiment, abscessus, obortos in his partibus, quorum ratione patientes moriuntur, non ex capitis vulnere quod ex capite copiosum pus posse ad inferna viscera delabi non sibi persuadeant : prout in plerisque observavi, mediam thoracis, et abdominis cavitatem pure fuisse refertam."

Slegelius, we are informed, attributed the phenomenon in question to transumption of pus, from having observed that the external wound always became dry at the time that abscess began to be formed in the liver. The disappearance of suppuration on the external wound, he consequently regarded as a most alarming symptom.

Meekren has published, in the work already referred to, letters which passed between himself and Barbette and Zas, two Dutch practitioners, relative to the following question; "Since not unfrequently injury of the cranium and brain is followed by suppuration of the liver, it is asked by what routes the purulent matter is conveyed from the brain to the liver?" Meekren alludes to the support which the opinion, that purulent matter passes through secret ways from the head to the liver, derives from the cessation of suppuration in the seat of the primary injury; and also mentions the opposite opinion entertained by some, that the occurrence of abscesses in the liver in cases of this kind is owing to a morbid constitution of that viscus.

Barbette does not admit the theory of the purulent matter being conveyed from the head to the liver. He thinks that the local injury of the head occasions putridity of the blood, which is in consequence partially converted into purulent matter, and he assigns what he regarded as satisfactory reasons why the liver only, and none of the other viscera, becomes the depositary of the purulent matter that is circulating with the blood.

The individual case of abscess of the liver after injury of the head, described by Meekren, Zas is disposed to regard, from the circumscribed character of the abscess, as the consequence of some contusion or injury of that viscus. He allows, however, that abscesses of the liver may follow injuries of the head, and seems disposed to attribute them to a sympathy maintained by the membranes, which he regards as expanded nerves.

Bianchi supposed that, in cases of this kind, the purulent matter is absorbed from the wound, and circulates along with the general mass of the blood, and that the liver receives the largest portion of it only from its being larger than any of the other viscera; from the course of the fluids through it being of greater extent; from the fluid it secretes being more viscid, and its vessels, consequently, better fitted to permit the filtration of purulent matter through them; and from its possessing no muscular power by which it can return the purulency that accumulates, into the circulation.

M. Bertrandi rejects the doctrine of nervous sympathy, as explanatory of this class of cases, on the ground, that, if the phenomena depended on nervous communication, the parts which are supplied with nerves from the same source should be affected equally with the liver. He rejects also the theory of metastasis, since abscess of the liver occurs in some cases of apoplexy, coma, and other diseases of the head, not accompanied by suppuration; and he is disposed to refer the phenomenon entirely to derangement of the circulation of the blood. In cases of injury of the head, in which abscess of the liver is chiefly to be feared, there are, he conceives, manifest symptoms of increased determination of blood to the head; the increased quantity of blood returning by the descending *vena cava* will retard the flow in the ascending cava, and this, he imagines, will chiefly affect the hepatic branches. The stagnation thus produced gives rise to inflammation and suppuration. M. Bertrandi's theoria morbi leads him to conclude that blood-letting practised at the foot, will still farther retard the motion of the blood in the ascending cava; and he states that he has more than once, in cases of this nature, seen patients become suddenly yellow, from jaundice supervening upon blood-letting thus practised.

A memoir, by M. Andouillè, which immediately follows that of M. Bertrandi in the Memoires de l'Academie, (p. 168), consists chiefly of cases in confirmation of Bertrandi's theory of hepatic venous stagnation, and corroborative of the impropriety of bleeding from the foot, which he founded upon that theory.

The forty-fourth volume of the Journal de Medecine for 1775 contains a criticism on Bertrandi's Memoir, by Dr Morin of Arranches. The object of Dr Morin's Essay is to show, 1*st*, That besides the general sympathy which exists betwixt all parts of the body, each organ possesses a peculiar sympathy; 2*d*, That the doctrine of metastasis "ne doit point etre admise commeune simple hypothese;" 3*d*, That the circulation of the blood, after blows on the head, is not affected in the way M. Bertrandi supposes; since the effect of an injury of the head is to diminish, not to increase, the flow of blood to the head; and therefore the quantity of blood flowing to the lower extremities, and, consequently, to the liver, is increased; 4*th*, To prove the doctrine of revulsion and derivation.

M. Pouteau has likewise discussed at some length the theory of M. Bertrandi, in a "Memoire sur les Abcès qui se forment a l'occasion des plaies de la tête," to be found at p. 111 of the second volume of his Œuvres Posthumes, (Paris, 1783.) The following are the conclusions to which M. Pouteau is led.

1*st*, Blows on the head, if of sufficient severity to derange the organization, render the passage of the blood, from the arteries into the veins and sinuses of that part, more difficult.

2*d*, The ramifications of the inferior aorta are overloaded with all the blood which in the state of health passes from the arteries into the veins of the head.

3*d*, The suppurations which occur, in consequence of these injuries, in the lungs, the intestines, and other viscera of the abdomen, and particularly in the liver, are not occasioned by the obstruction of the veins of those parts, but by the distension of the arteries.

4th, Bleeding at the foot, by determining a greater column of blood into the inferior aorta, may increase the obstruction (embarras) already existing in the branches of that artery, and may, in particular, accelerate the inflammation and suppuration of the liver.

Mr Cheston, in the 2d section of the third chapter of his "Pathological Inquiries and Observations," (Gloucester, 4to, 1766,) treats of abscesses of the liver attendant on fractured skulls. Mr Cheston is not disposed to admit the doctrine of metastasis in explaining cases of this nature. "If," says he, "instances can be produced wherein matter has been found in no small quantity in the liver, when very little if any appearance of suppuration has been observed within the cranium, we must at least allow that abscesses may exist in the liver, without being derived or occasioned by falling from this part to that abdominal viscus." He then proceeds to detail a case in illustration of this opinion, (p. 36.)

Mr Cheston further conceives, that the explanation of this class of cases upon the theory of metastasis is untenable, because, as he alleges, in cases of translation of matter, there is little appearance of inflammation, the matter being rather disseminated through the viscus on which it falls, than collected in one or more large vomicæ. The hardened inflammatory state in which the liver is found in cases of injury of the head proves, therefore, that the cause is confined to this part alone.

It would appear from the remarks which Mr Cheston makes on Bertrandi's theory, that he had either not read or not understood him. He himself thinks it most probable, that, in cases of this nature, the functions of the liver are injured by a sympathetic irritation of its vessels and neighbouring parts, from a diseased state of the brain; and that in consequence of this derangement of the hepatic function, of which the vomiting and increased secretion of bile are sufficient proofs, such obstructions may be formed as will afterwards terminate in suppuration. He is disposed to think also that the shock which the body must receive, in many cases of injury of the head, may, from the size, as well as from the soft pulpy texture of the liver, affect the functions of that viscus in particular, and thereby not a little assist in confirming those obstructions, which afterwards could not be terminated but by suppuration.

Bichat, in his exposition of Desault's doctrines on wounds of the head, after alluding to the different explanations relative to the formation of abscesses of the liver in consequence of such injuries, says, "Let us confine ourselves to what strict observation demonstrates, viz. 1*st*, That there exists an unknown but actual sympathy between the brain and the liver, which is closer than any that exists between the other viscera; *2d*, that, in consequence of this sympathy, affection of the brain almost always produces some alteration in the functions of the liver, as is shown in the dead body, by its being found gorged with blood, inflamed, and containing abscesses; and in the living subject by nausea, bilious vomiting, &c. This sympathy is not confined to the brain itself, for the internal and external coverings of this organ likewise participate in its influence." The circumstance of the formation of abscesses of this nature being confined to the liver, satisfied Bichat that they do not depend on general succussion of the body, but that the nervous system is the principal agent of communication, on which the circulation acts only indirectly.

Schmucker has remarked, that the explanation of Bertrandi, which attributes the suppuration of the liver frequently found after wounds of the head, to a determination of blood to the head, and an interrupted circulation and consequent stagnation in the large vessels, corresponds best with his observations, for in most *post mortem* examinations he has found the vessels of the head much dilated, and particularly the longitudinal sinus obstructed by polypous growths. (Chirurgische Wahrnehmungen, Erster theil, p. 161.)

M. Richerand (Nosographie Chirurgicale, ii. 227, edit. 1808,) conceives that the formation of abscesses of the liver after injuries of the head depends on the general shock which the body receives in accidents of this nature, and in which the liver participates. The great size of this organ, its weight, the manner in which it is fixed in its place, and its soft and easily lacerated parenchymatous structure, appear to him sufficient to explain why it is more liable to suffer than any other organ, in injuries of this nature. In support of his views on this subject, M. Richerand has mentioned some cases in which individuals whose skulls had been fractured in consequence of their falling from a height, and who died within twenty-four hours after the accident, were found to have their livers also lacerated. He alleges that, when no general shock has been communicated to the body, wounds of the head are never followed by abscess of the liver. M. Richerand caused about forty dead bodies to be precipitated from the anatomical theatre, at the Hospital of St Louis, into the dead-room below it,—a height of about eighteen feet—through an aperture in the floor of the former, by which these two rooms communicate. The brain and the liver were, he says, always more or less injured, the latter presenting, in some instances, lacerations of considerable depth. No viscus, he continues, without excepting even the brain, suffered more than the liver from the violent commotions produced by the fall. M. Richerand regards this explanation of his as " absolument nouvelle." I shall leave it to those who delight to humble the pride of aspirants to originality, to determine how far the theory is anticipated by Mr Cheston in the passage I have quoted from him, (p. 403).

M. le Baron Larrey, in the fourth volume of his Memoires de Chirurgie Militaire, p. 213, combats the opinion advanced by M. Richerand, and endeavours to show, (p. 238,) 1*st*, that abscesses of the liver following wounds of the head are very seldom produced by a direct concussion of the liver, either from the individual having fallen on the right hypochondrium, or from some hard substance having struck that part of his body; 2*d*, that these abscesses occurring after wounds of the head are owing to a sympathetic irritation which the liver receives from the inflammation established in the fibrous membranes of the cranium, or of the bones of the upper and lower extremities, particularly of those of the same side; and to the metastasis towards the same viscus of ichorous miasmata, or of a more or less subtle fluid; 3*d*, that it appears that the communications of the morbific principles of the injured parts with the hepatic organ, take place most easily when they have not to cross the median line of the body, which means, I presume, that the inflammation of the liver is generally in the right or the left lobe, according as the injury is on the right or left side of the head.

M. Larrey thinks that, in the cases mentioned by M. Richerand, where fracture of the cranium and laceration of the liver were simultaneously produced by a fall, they were the effects of separate injuries, and might have existed separately. He records an example of death being produced by a laceration of the liver, in consequence of a fall on that region, without either the head or the integuments of the abdomen being injured; and he alleges, that, in many instances of violent falls followed more or less immediately by death, the cranium and membranes have been found severely injured without the liver having suffered. He relates three cases of severe falls, in all of which the head was injured; yet neither in two of the patients who died was there any appearance, nor in the third who survived was there any symptom, of the liver having suffered. M. Larrey has likewise related three cases of sabre wounds of the cranium received in duels, in none of which did the individuals fall on receiving the injury, yet they all died affected with abscess of the liver.

The only other topic connected with the occurrence of abscesses of the liver subsequently to injuries of the head, to which we have to advert, is, the question how far this occurrence is attended by any symptoms calculated to warn the practitioner that it is in progress?

Marchetti had observed the posterior and lateral part of the neck to become painful at the time he supposed the translation of pus to be going on. This symptom has received from other authors almost as little credit as the explanation by which it was accompanied. "Other authors," says Mr Cheston, "who have taken notice of this complicated disease, have never once mentioned this symptom, unless from Marchetti, which surely is too remarkable to be overlooked or forgotten." Mr Cheston states, however, that it is not unusual for patients who have received any violence, by a fall or other accident, on their head, if not thereby rendered insensible, to complain, soon after the injury, of a pain in the top of their shoulder as well as above the scapula; this pain he attributes to the violent shock communicated immediately to the neck and parts adjacent.

M. Pouteau is of opinion that the pain observed by Marchetti was merely produced by nervous irritation, which propagated itself on this in a more obvious manner than on a hundred other occasions. The patient whose case is related by Mr Batting had, at the very beginning of the disease, the symptom which Marchetti says generally indicates a metastasis of purulent matter to the thorax or abdomen. "Whether," says Mr B., "it be in fact a common antecedent, future observation alone can determine, as writers since his time have not observed or attended to it."

In many instances, the first information that is obtained of the existence of abscesses in the livers of those who have suffered injuries of the head, is derived from examination after death.

M. Bertrandi states that abscesses in the liver following wounds on the head most frequently form without their being perceived; and this he considers the less remarkable that idiopathic inflammation of the liver is very rarely discovered. "The formation of these abscesses," says M. Pouteau, (p. 122, 3,) "frequently does not announce itself by any troublesome symptom, and when there is reason to suspect their existence, it is too late to remedy it."

Morgagni remarks, Epist. li. §. 22, that when there occur certain symptoms of hepatic affection, and the wound becomes suddenly dry, yielding less pus than it should do, we may suspect translation of the pus to the liver, but we cannot rely on this with certainty.

According to Bianchi, the principal mark of approaching abscess of the liver is to be found in the circumstance of the primary inflammatory affection showing an indisposition to yield to remedies. He states that he has always observed in individuals becoming affected with abscess of the liver, from a few to a hundred days after having received an injury on the head, the symptom to which Hippocrates alludes in the following prognosis;—"Qui multo tempore tenues et crudas mingunt urinas, si cætera ut evasuris adsint signa, hos ad regiones infra septum transversum abscessum expectare oportet."

"The diagnostic symptoms," says Mr Cheston, "of an injured liver tending to suppuration, will be then in general evident to a careful observer, and may be known by a pain in the abdomen about the right hypochondrium, bilious vomitings, irregular shiverings, sallow countenance, and a swollen tumid belly, attended with a more or less remarkable fluctuation of water. Sometimes, when the inflammatory symptoms run high, the patient is attacked with a burning fever and insatiable thirst, in which case a delirium generally precedes his dissolution." P. 43.

II.—*Affections of other organs than the Liver in Injuries of the Head.*

But the liver is not the only organ which in cases of injury of the head is liable to inflame and suppurate, as in fact we have already had occasion to conclude from the observations of Marchetti and Molinelli.

Notwithstanding that Molinelli was led by his experience to believe that these secondary effects of injuries of the head always occur in abdominal viscera, we find that they have not unfrequently been observed in the viscera of the thorax.

Nich. Massa mentions (in his Anatomiæ Liber, Introductorius, cap. 28,) that, in 1533, there occurred to him a case of injury of the head, in which, upon dissection, he found a large quantity of purulent matter in the cavity of the thorax, and an abscess on one of the lungs, an ulcer on the exterior surface of the left auricle of the heart, and an abscess in the right ventricle. This patient had not suffered pain, nor been affected with cough.

Valsalva, as we learn from Morgagni, (Epistle li. Section 22,) though he had scarcely ever seen abscess of the liver supervene upon injuries of the head, had in a number of cases observed these injuries to be followed by inflammation of the cavity of the chest and of the lungs.

Several cases of inflammatory affections of the contents of the chest, succeeding to injuries of the head, are narrated by Morgagni, Lib. iv. epistle li. Section 17. Case of injury of the head, fatal on fourteenth day. Purulent matter found between the *dura* and *pia mater*; hardish tubercles here and there in the lungs, some of which yielded *sinceram saniem*; the respiration became laborious some days previous to death.

Section 18. Similar case; patient lived to the twenty-fifth day. The lungs were very red, and small abscesses were found in them.

Section 19. Similar case; patient lived two months. Abscess in the brain; many abscesses and tubercles in the lungs.

Section 20. Blow, without fracture; no disease of brain found; both sacs of pleura filled with purulent matter; lungs studded with tubercles, some in a state of suppuration.

Bertrandi was aware that the lungs are sometimes affected after injuries of the head, for he expresses his conviction that his explanation of the mode in which inflammation is produced in the liver is equally applicable to the lungs, conceiving that in the cases of this nature, in which these organs become diseased, a derangement in the motion of the blood is produced by the meeting of the two *venæ cavæ* in the right auricle.

Delaisse, in his Recueil d'Observations de Chirurgie, Paris, 1753, mentions (39e. observ. p. 181,) a case of severe fracture of the head, in which the arm also was fractured. Every thing went on well till the sixteenth day, when secondary fever occurred, and along with it, a frequent cough, accompanied with difficulty in breathing. On examining the body after death, everything was found quite healthy within the cranium. On cutting into the lungs, there escaped a large quantity of purulent matter, of such a colour and consistence, it is remarked, as could be desired in necessary suppurations.

Schmucker, in his celebrated work on injuries of the head, (Chirurgische Wahrnehmungen, 1er theil. Berlin, 1774), has related a case (4te. beobachtung, s. 55,) of a wound in the right parietal bone, of which the patient died on the twenty-ninth day after the injury. In this individual, besides an effusion of purulent matter in the longitudinal sinus, and on the surface of the brain, there were marks of extensive inflammation of the pleura, and a number of small abscesses in the lungs. The external convex surface of the great lobe of the liver was inflamed, and its vessels dilated with stagnated blood,

In Mr Dease's fifty-sixth case, (p. 264), although no symptom of pulmonary affection appears to have occurred during life, it was found, on dissection, that the posterior part of the left lobe of the lungs was heavy and dense, and when cut into, there issued a purulent viscid serum ; the right lobe adhered firmly to the pleura, and could not be detached from it but by force ; posteriorly and superiorly it was dense, heavy, and looked like the substance of a child's liver, and was certainly much inflamed ; when cut into or torn, a purulent sanies issued out. As, says Mr Dease, (p. 261), there was no matter to absorb, it accounts for his not having had any irregular shiverings. In all appearance, the inflammation of his lungs took place the last days of his illness.

In some cases, subsequently to injuries of the head, collections of purulent matter have formed in the joints and adjacent textures.

In the twenty-second case related by Mr Dease, that, viz. of a man, twenty-one years of age, who had received a wound on the head, which divided the first table of the left parietal bone for about an inch and a half, the patient became affected with shivering at the end of a fortnight. This continued irregularly for a fortnight, when he complained that his left leg was a little heavy to him, and on examination fluctuation was discovered above the knee. There had been no previous inflammation, nor did he ever complain of soreness, and the skin was not in the least discoloured. An ample incision having been made, nearly a pint of well-conditioned matter was discharged. About eight days afterwards, it was necessary to make a counter-opening under the ham, there being a large discharge from below. Two days after this, there appeared a tumour over the left clavicle, and, on this being opened, a quantity of white tenacious matter that seemed, it is said, to come from the thorax, was discharged. Mr Dease regards this case as an example of translation of matter from the head to the knee and clavicle.

The following case occurred in the Royal Infirmary of this city, under the care of the late Dr Brown.

Jan. 9, 1807. John Allan, aged 67, labourer in a distillery. The integuments of the cranium of the head, and for a considerable way around in all directions, are of a natural colour, but painful to the touch, and slightly œdematous. Over the posterior extremity of the left parietal bone, near the cranium and coronal suture, there is a more regular and slightly prominent swelling, with an opening at its middle, which admits a probe for some way below the integuments. Complains of constant slight nausea; aching pain along the scalp, sometimes extending above the right eye, the lower eyelid of which is a little reddish, and slightly œdematous; frequent shivering, and extreme sensibility to cold; some thirst; little appetite; bad sleep; belly slow; tongue white; surface apt to be warm. This affection is the consequence of a blow on the head, by a bucket falling from the height of fifteen feet on the 1st current. He remained insensible for a few minutes after the accident, and it was half an hour before he could walk home. A small wound at the opening described, bled a little; he never vomited, but says the nausea followed next day; the right side of the neck feels a little tender; and the affection of the scalp has been gradually extending. He has been twenty-three years in a distillery, but has lived pretty regularly.

The sinus being laid open at admission, and the purulent matter evacuated, it was found necessary by a deeper incision to give vent to another collection of matter betwixt the pericranium and bone, the latter feeling rough, but neither moveable nor unequal, though, from the thickness of integuments at the part, it had something of a depressed feel.—*Admovr. vulneri Cataplasma Emolliens. Habt. Pulv. Jal. Comp.* ʒi. *et Infus. Sennæ* ℥iii. *post horas* ii. *si opus.*

10th. Passed a tolerably good night, and is much better to-day; less tenderness of scalp, and wound cleaner; copious alvine evacuation from the senna; pulse about 90.—*Sumat cras primo mane Infus. Sennæ* ℥iii. *reptr. ad* ℥ii. *post horas* iii. *si opus.*

11th. Was rather uneasy in the night; less pain in the integuments of the head, which, however, are still œdematous; pulse 92; tongue white; one dose of infusion taken has operated scantily. —*Capt. statim Pulv. Jal. Comp.* ʒi.

12th. Slept ill from pain of his right knee, which is swelled; sore on the head clean; no headach; tongue white; pulse 84.—*Admovr. Hirudines* vi. *genu, et repetr. Pulv. Jal. cras mane.*

13th. Was restless and somewhat delirious in the former part of the night. A large collection of matter in the neighbourhood of the sore was opened to-day by an incision two inches in length. Pain and swelling of the knee still troublesome; pulse 82; tongue white; no stool.—*Capt. Infus. Sennæ* ℥ii. *Repetr. 3tia quaque horâ ad alv. solutionem.*

14th. Copious alvine evacuation; was again restless in the former part of the night, and somewhat delirious, but is quite distinct this morning; complains much of pain in his knee; copious discharge of rather thick fœtid matter from the wounds.—*Admovr. genu Fomenta tepida; sumat mist. sal.* ℥i. *3tia quaque horâ.* Common dressing.

15th. Passed a better night; discharge continues, but sores look rather sloughy; knee rather more swelled; pulse about 84; no stools.—*Sumat Infus. Sennæ* ℥iii. *mist. salin. u. a.*

16th. Was restless during the night, and is still a little indistinct; copious discharge of thick tough matter from the sore, and an extensive portion of the cranium bare; swelling of knee greater, more diffused, and doughy; pulse 96, rather feeble.—*Omittr. mist. Salin. Habt. vin. rub.* ℥viii.

17th. Still somewhat indistinct; great discharge of matter from the head, to facilitate which one of the former incisions was carried backwards through the detached integuments; swelling of knee continues, and fluid can be made to fluctuate under the patella.—*Continr. vinum. Habt. Ser. vinos* ℥iii.

18th. Slept some in the night, and seems quite distinct to-day; a small artery of the scalp required a ligature; wound gives a copious fœtid discharge.—*Continr. vinum ad* ℥x; *alia u. a.*

19th. Debility increasing, and swelling extending over the whole leg; a large portion of the cranium is bare; no stool for two days. —*Injicr. Enema vespere. Continr. alia.*

20th. Died last night.

Dissection.—On removing the integuments from the cranium, the abscess was found to be very extensive, covering externally to the pecranium, part of the frontal, parietal, temporal, and occipital bones. In the central part of the abscess opposite the incisions, the pericranium was sloughy, and detached from the sagittal half of the parietal bones for a space of about five inches in length and four in breadth. The surface of the bone was a little rough, but neither discoloured nor unsound, and the *dura mater* adhered every where to the inner surface of the cranium. The brain and its membranes were sound.

A serous effusion had taken place in the cellular substance of the right leg, particularly about the knee; externally the inferior extremity of the *vastus externus* was prominent, dark-coloured, and soft; when cut into, it was found to contain an abscess, which extended four or five inches upwards in the body of the muscle, and downwards for about two inches on the outside. The joint was found to contain much purulent matter, which came in part from the other abscess or bursa above the patella. The synovial membrane lining this bursa, the joint, and crucial ligament, had a dark-red colour, an extremely vascular, and somewhat of a flocculent, appearance. The cartilages had lost their usual bluish tint, and were of an ash-grey colour in general; very thin in some parts, exposing the bone, which was smoother, as if covered with synovial membrane.

Klein of Stuttgart, in his Chirurgische Bemerkungen, (12mo, 1801,) mentions (p. 136,) that he has found after injuries of the head, alteration of the spleen much more frequently than of the liver.

Dr Hennen, after pointing out that in a particular case "the sympathy between the brain and liver was strongly marked, and took place at a very early period," observes; "The sympathetic affections occurring in cases of injury of the head vary in the organs which they attack and in the degree of violence. In the thorax, they appear, from simple increased secretion from the lungs, to tubercles and extensive purulent formation in their substance. Serum is also often found in the cavity, and very frequently in the pericardium; and even in the heart itself abscesses have been discovered. In the liver, morbid appearances are found throughout every shade of affection of its membranes or its secretion; either pain and tumefaction, with bilious diarrhœa, or the same with a perfect torpor of its functions; and inflammatory affections from increased vascularity to the formation of extensive collections of matter. In the spleen, pain, tumefaction, hardness, and abscess are occasionally observed. The stomach suffers more frequently than any other organ; but it appears to be more from general nervous sympathy than from any organic affection, which is seldom discoverable on dissection."

III.—*Affections of the Liver and other Organs in Injuries of other parts than the Head.*

But injuries of the head are not the only species of injury which is liable to be followed by the formation of abscesses in different parts of the body.

Ballonius relates that he had found an abscess in the liver of an individual who had been wounded with a dagger about the false ribs, though the wound did not penetrate to where the extremity of the diaphragm reaches. "Whence," he asks, "did this arise? Perhaps in the same way as in wounds of the head."

M. Goursaud, in his Essay on Metastasis, (which gained the prize of the Academy of Surgery in 1751, and which is to be found in the sixth volume of the 12mo edition of the Prix de l'Academie,

p. 3,) has related two cases in which abscesses were found in the liver after death, supervening in one case to a wound of the little-finger with a sword, and in the other to a blow on the upper part of the right tibia, which produced only a slight contusion.

In the first of these cases, it is mentioned, there came on convulsive movements through the whole arm; and fever and swelling of the part speedily manifested themselves. The patient was bled repeatedly without any advantage. At the end of three days, he felt a dull pain in the right hypochondrium. The convulsive motions and swelling not diminishing, his finger was cut off, with beneficial results as regarded these two symptoms; but the fever always continued, and the patient died at the end of twenty days. On opening the body, there was found a demi-septier of pus in the proper substance of the liver, with a considerable loss of substance. The wound suppurated very little during the latter days of his life.

In the second case, the patient was seized on the tenth day of the accident with a considerable degree of fever, and died five days afterwards. The abscess found in the liver is said to have been pretty considerable.

" These observations," says M. Goursaud, " show us how much wounds in which the nervous system is affected, particularly at its origin, are subject to suppression of suppuration, and may give rise to the formation of different deposits interiorly. In these cases the animal spirits are not distributed in the different parts with freedom, and it often happens that their quantity is even diminished; in these cases the functions of the viscera are deranged, and the vessels which, from their structure, have less ressort; a circumstance that may give occasion to obstructions, and be a second cause of abscesses in the different parts."

" I have seen several times," continues the same author, " abscesses, the matter of which formed and decided, had re-entered into the circulatory system without producing any bad consequence. We know that the pus which re-enters into the mass of the fluids, if it be not of a bad character, may circulate there for some time without altering it. And even in the case of its being vitiated, it would not form at once a deposit. Subjected to the laws of the circulation, and distributed throughout all parts of the body, it might at most, after several repeated circulations, deposit itself on some part, and there occasion inflammation." P. 15–16.

" La metastase ne peut donc pas se faire subitement, ni produire tout a coup ces abscés que l'on regarde comme les suites de cet accident; car, pour que l'humeur purulente qui rentre dans les voies de la circulation, et qui se depose sur quelque partie, puisse y former un abscés, il faut qu'elle y produise une inflammation, et qu'elle parcourt les memes temps que celles qui arrivent dans les autres parties." P. 10.

M. J. L. Petit, (in the chapter "Des Ulceres" contained in the second volume of his Traitè des Maladies Chirurgicales, &c. Paris, 1790,) relates a case in which a bullet pierced the two condyles of the femur without entering the joint, of which injury the patient died on the 28th or 30th day. On examining the three cavities of the body after death, no marks of disease were found, except three abscesses in the concave part of the liver, each of the size of an egg, and at some distance from one another. He had no doubt that these were the cause of death, until, on dividing the fractured bone, he found the spongy portion, both of the epiphysis and apophysis, filled with a serous oily purulent matter.

Mr Becket, in his Chirurgical remarks on a Wound of the Head, (Collect. of Tracts, &c. Lond. 1740, Vol. i. p. 4,) mentions the case of a man, who had received a violent contusion on the upper part of his left arm, a little below the shoulder. Suppuration went on for several weeks; the patient at last was seized with shiverings, became feverish, and at length died violently convulsed. There were some marks of inflammation in the cavity of the chest. On the division of the integuments of the abdomen, a very large quantity of yellowish fetid matter discharged itself, which was somewhat viscid; the intestines floated in this matter, for the abdomen was full of it. In the lower part of the concave side of the liver there was a very large abscess. In the lower part of the abscess was an orifice capable of admitting the end of one's finger; by which, without doubt, matter discharged itself into the abdomen.

Klein of Stuttgart, in the work to which I have already had occasion to refer, p. 136, states that he has seen induration and suppuration of the liver, jaundice, &c. follow severe injury of the shoulder-joint and wounds of the chest more frequently than wounds of the head.

M. Larrey states, (Memoires, iv. 228,) that he has often seen individuals who had suffered wounds of the gynglimoid articulations of the upper or lower extremities, die in consequence of abscess of the liver, which had probably been going on from the time the wounded parts were attacked with inflammation. He relates the case of a Prussian soldier who had a false joint about the middle of the humerus, in order to obtain the re-union of which a seton was introduced between the fragments. The arm speedily became much inflamed and swelled, and the patient experienced very severe pain in the right hypochondrium, difficulty of breathing, and violent traumatic fever. After death, an enormous abscess was found in the centre of the great lobe of the liver, just about to open into the abdomen.

In the first volume of his Memoires, p. 306, M. Larrey has related a case of gunshot wound of the left elbow-joint, on account of which he performed (primary?) amputation. Every thing went on well till the 13th day after the operation, when the patient was attacked with nervous fever. The patient died on the 19th day. On opening the body, an abscess was found in the liver; another very large abscess in the left lung, and effusion into the thorax.

Dr Hennen, in his Principles of Military Surgery, after describing the local appearances found on dissection in cases of fractures, remarks, (2d edit. p. 124,) "All this organic injury cannot be supposed to exist without great general disease; the fever, the cough, the diarrhœa, are all harassing and alarming to the greatest degree; they sometimes invade separately, and sometimes in combination, and produce not only all the appearances of pulmonary consumption, but too frequently its fatal termination. If tubercles or a tubercular disposition exists in the lungs, no medical aid will relieve the sufferer; and, indeed, while the great source of irritation remains, even the temporary alleviation of his misfortunes is looked for in vain. The first approaches of these insidious bowel and pulmonary affections are much better combated by management and diet than by any medical means."

I might quote from a great variety of authors to show how much surgeons have been alive to the danger of the effusion suddenly ceasing, in cases of suppurating wounds, and the matter being conveyed to, and deposited in, internal viscera. Thus in Handley's Colloquia Chirurgica, or the Art of Surgery epitomized, (London, 1733,) there is the following portion of a professional dialogue.

Q. What are repellers?

A. Such medicines as drive back the humour from the part.

Q. What mischief comes of their untimely application?

A. They wrinkle the skin, increase the pain, harden the humour in the part, and often return it to some noble and principal part, (p. 17.)

M. Le Dran, in his Traité sur les Playes d'Armes à Feu, (Paris, 1737,) in speaking of the secondary accidents that may occur in consequence of such wounds, says, (2de partie, p. 98,) "We sometimes see a speedy reflux of matter produce abscesses in parts very distant from the wound; and many things may occasion this reflux, as inflammation of the aponeurotic parts, fever, &c. without its being possible to prevent it. If this reflux take place by the lymphatics going to an emunctuory, and all the matter that is reabsorbed stops there, it is there the abscess forms, and the patient may recover. But if the reflux takes place by the lymphatics which open into the blood-vessels, or by the blood-vessels themselves, the purulent matter that is carried into the torrent of the circulation generally stops at the lungs or liver. The occurrence of such a reflux is announced by irregular shiverings, which are followed by violent accessions of fever accompanied with clammy sweats, and these shiverings succeed one another rapidly till the patient dies. If the deposition takes place in the lungs, an abscess is formed there, and the pus is almost always effused on the diaphragm, when the abscess bursts. If in the liver, one or more abscesses form below its external coat, and when these abscesses burst, the pus is effused into the abdomen. Lastly, if these depositions occur in parts of the body beyond the reach of surgical aid, the patient will infallibly die." The same idea is repeated by Le Dran in the troisieme partie, p. 108, where he treats " de quelques abcès consecutifs."

M. J. L. Petit, in his chapter entitled Des Plaies en general, (Traitè des Maladies Chirurgicales, i. 6, &c.) has enumerated at considerable length the circumstances which he conceives may occasion the reflux of purulent matter, and the symptoms which announce that this reflux is likely to happen, that it is happening, or that it has happened. The abscesses which succeed to such a reflux, he remarks, (p. 11,) may form in the vicinity of the wound, or be more or less remote from it. It is sometimes in the neighbouring conglobate glands that they form, as in those of the neck when the wound is on the head, in those of the axilla when the wound is on the hand or arm; in those of the groin or loins in wounds of the lower extremities. Lastly, the pus which flows back into the blood is deposited more frequently in the lungs and liver than elsewhere, and more frequently in the liver than in the lungs.

M. Mehee, (in his Traitè des Playès d'Armes a Feu, Paris, an viii.,) after alluding to the large abscesses that are frequently occasioned by severe contusions, mentions that the fluid forming these abscesses is sometimes taken up again by the vessels, and in this way a reflux of purulent matter is produced. This is rendered apparent by the cessation of the suppuration, and by the dryness of the wound, by violent fever, &c. speedily occasioning the patient's death. The purulent matter after entering the circulation sometimes deposits itself elsewhere. If these depots form externally, they may be opened; but if, as too often happens, they form internally, they are difficult to manage, and the patients very frequently die, because the organs in which these kinds of effusion generally occur are the brain, the lungs, and the liver, and it is scarcely possible to detect their situation in any of these viscera.

The following case occurred under my own observation at Lyons. A boy, about sixteen years of age, was brought into the Hotel-Dieu on the 30th August, with a compound fracture of the leg. The laceration of the integuments was over the spine of the bone, and of small extent. 1st October. Reunion seems to be going on. A small abscess had formed, but has been evacuated, and seems to be healing. With regard to the symptoms which supervened in this case, and which ultimately terminated in death, I can only mention that they were such as to lead M. Mortier, under whose care he was, to suspect and detect that he had committed three several excesses in diet, and to predict before the body was opened that we should find marks of the gastro-enterite, which he conceived these excesses to have occasioned.

Dissection.—The external surface of the skin, as well as the subcutaneous cellular membrane, was of a yellow colour, and the same colour was found to prevail over the external surface of the intestines, over the peritoneum lining the parietes of the abdomen, over the surface of the cartilages of the ribs, and of the cartilages covering the extremities of the long bones. It was observed likewise on the external surface of the *dura mater*. The gall-bladder was found distended. On examining the internal surface of the stomach, M. Mortier acknowledged that the inflammation was very slightly marked, though he thought it certain that it had existed. The mucous membrane was pale over nearly its whole extent. The duodenum, M. Mortier said, was not very red; that it was, however, inflamed, being much browner than the healthy surface of the stomach, the pylorus being the boundary between the different colours. A long worm was found in the small intestines, but their mucous membrane, so far as it was examined, was pronounced to be healthy. About the middle of the right lobe of the liver there existed several abscesses, some of which were beginning to point upon the convex surface, while another situated on the concave surface about an inch to the right side of the gall-bladder, and which had caused the absorption of nearly the whole of the substance of the liver below it, was prevented from discharging its contents into the abdomen by a preternatural adhesion to the external surface of the duodenum on which it rested. The inferior border of the lung on the same side was somewhat inflamed. No appearance of disease could be observed in the brain.

IV.—*Affections of various Organs occurring subsequently to Surgical Operations.*

I have not been able to ascertain at what time surgeons began to be aware that the occurrence of internal inflammations is much to be apprehended after the performance of severe surgical operations.

M. Mehee was the zealous antagonist of the practice of amputation. A large portion of his doctrine upon this subject he has embodied in the consideration of a case in which the operation was performed, contrary to his advice, on account of an ulcerated knee-joint, which had long been the source of a most copious discharge of pus. The cutting off this outlet so suddenly, could not fail, he conceived, to occasion a deposition of pus in some other quarter; and as the individual in question had previously suffered much from pulmonary complaints, it was in the lungs he anticipated that the evil would manifest itself. The patient died, but M. Mehee did not ascertain by dissection whether or no his death was produced in the way he anticipated.

Dr Thomson, in his Lectures on Inflammation, (Edinburgh, 1813,) in speaking of the effusion or extravasation which occurs in chronic cases of pleuritic and peritoneal inflammation, which, he remarks, has a stronger resemblance to milk coagulated by white wine, than to any other substance to which he can compare it, adds, "I have seen this kind of effusion repeatedly in inflammations of the chest succeeding in old people to severe surgical operations, as for example after the amputation of a limb; but I am ignorant of the particular constitutions, and of the state of the body in which it occurs." (P. 245.)

Mr Guthrie, in his work on Gunshot Wounds of the Extremities, London, 1815, in arguing for the superiority of primary over secondary amputation, alleges, p. 74, that it is in cases of the latter class particularly that "the febrile irritation returns some time after the operation, instead of gradually abating; and after a continuance of a few days, or in some hours, cuts off the patient by an affection of some particular part. If it be the lungs, and they are most usually affected, the breathing becomes uneasy, there is little pain when the disease is compared with pneumonia or pleuritis; the cough is dry, and not very troublesome; the pulse having previously been frequent, there is but little alteration; the attention of the surgeon is not sufficiently drawn by the symptoms to the state of this organ, and in a very short time all the symptoms are deteriorated; blisters are employed, perhaps blood-letting, but generally in vain; and the patient dies in a few hours as in the last stage of inflammation of the lungs, in which effusion or suppuration has taken place. The first cases I saw of this kind," continues Mr Guthrie, "I believed to arise from the action of external causes after the operation; but I now believe it to depend upon a determination to, or irritation in, a particular part, in consequence of the operation, and I conceive the viscera in each person most predisposed to disease will be the most likely to be affected."

Mr Guthrie refers to Mr Rose, at that time Surgeon of the Guards, and to Mr Boutflower, Surgeon to the Forces, as having made observations similar to his own relative to the occurrence of inflammatory affections of the chest, subsequently to amputation.

"When the viscus affected is not so immediately concerned in supporting life as the lungs, I do not believe the termination is so rapid; it runs into suppuration, and abscesses are formed, which are generally supposed to arise from the commotion and shock given to the different organs at the moment of injury."

"I know that inflammation taking place in one part of the body, when the injury has been received in another, has been often noticed; and that this also happens in gunshot wounds, there can be no doubt, but it is by no means a common occurrence." Besides referring to a case related by Baron Larrey, Mr Guthrie has related a case of compound fracture of the thigh, in which Dr Chermside of the 10th Hussars, performed amputation five weeks after the injury, when the man was in a very reduced state with profuse discharge, great pain, and severe hectic fever. On the third day after the operation, the stump being easy, he complained of difficulty of swallowing, and a little pain in the situation of the thyroid gland, which, the next morning, was found to be swelled and inflamed. On the third day after the affection of the throat, the difficulty in deglutition increased, accompanied by some obstruction in respiration, and on the morning of the fourth he died, seven days after the operation, and in a state of great emaciation. On dissection, the whole substance of the thyroid gland was found destroyed, and good purulent matter deposited in its place, which descended by the sides of the trachea and œsophagus to the sternum, and had all but found its way into the larynx, between the cricoid and thyroid cartilages on the right side. The surrounding parts were but slightly injured, and could be readily dissected.

Mr Guthrie has related another case of secondary amputation, in consequence of a gunshot wound penetrating the knee-joint, in which death occurred nearly two months after the operation, and in which he found, on raising the soleus muscles of the opposite limb, which appeared perfectly sound, and of which he had never complained, for considerable attention was paid to him, a membranous bag containing a fluid in the course of the *tibialis posticus* muscle, and close to the interosseous ligament. "I punctured this shining semitransparent bag, which appeared to be the fascia running across, and let out between three and four ounces of good, thick, yellow, inoffensive purulent matter. The blood in the peroneal vein, which was close to the outside of the sac, was coagulated, or, rather, a coagulum had formed in it prior to death. There was no perceptible cause of injury, and little or no mark of inflammation; it would indeed give the idea of having been deposited without any. The integuments were quite in a natural state."

"I am not aware," concludes Mr Guthrie, "that this sudden and insidious attack of disease has been noticed hitherto as a disadvantage attending, in particular, secondary operations; and in thus mentioning it, I am desirous of drawing the attention of military surgeons to it, and of gaining further information on the subject; for, as I have already stated, I have reason to believe many cases are lost in this way, without the cause of death being ascertained by dissection."

Mr Charles Bell, in an essay entitled " Of Pulmonary Diseases in connection with Local Irritation, and consequent upon Wounds and Surgical Operations," which he has published in the first volume of his Surgical Observations, London, 1816, p. 241, has expressed his opinion that inflammation of the lungs is by far the most frequent cause of death in severe wounds, and especially in compound fracture. The lungs Mr Bell considers to be peculiarly liable to become diseased in cases of this nature, merely from their being the viscera, which, in most people, are most liable, from predisposition or from previous derangement, to take on disease, when the general health becomes affected from accidental causes.

"On reviewing this subject," says Mr Bell, p. 257, "it will be apparent that injuries to the frame, whether the effect of wounds or of surgical operations, by exciting a high state of irritation, tend to disorder the lungs; and that especially, if there be any tendency to disease in this organ, it will be developed; and, increasing the constitutional disturbance, endanger the patient's life. It also appears that as wounds, by their sudden and more violent inflammation, produce a corresponding acute attack on the lungs, so do they often, by more gradual influence, bring on a phthisis."

Dr Hennen, in treating of amputation, observes, (2d edition, p. 268,) that " Large quantities of purulent matter are sometimes found, in fatal cases of amputation, in the thorax, either in the substance of the lungs themselves, or floating loose in the cavity; or serous effusions, and great congestions of blood in the body of the lungs, with conversion of them into a substance resembling liver, designated by the appropriate appellation of hepatization by the French surgeons. In the abdomen abscesses are often discovered, particularly in the liver, and at a very short period from the removal of the limbs. In the adjacent joints, also, matter is frequently found. I have met with it in three cases in the hip-joint, where the operation had been performed in the thigh, and two in the shoulder-joint, where the arm was carried off by cannon shot; and even in parts still more distant from the original injury, diseased actions, apparently sympathizing with the state of the stump, have also been discovered. I know of no particular set of symptoms that peculiarly characterize these instances of metastasis. Great irritative fever has been present in some cases; hectic and topical affections of the chest, as dyspnœa, cough, and sense of suffocation, have been found in those where metastasis to the thorax has taken place; and the usual symptom of deranged biliary functions have appeared before death, where the liver has been its seat. Of the cure of cases of this nature I can say nothing satisfactory."

Dr Hennen has added some cases illustrative of these observations, p. 271, &c.

The following case fell under my own observation.

Lyons, 25th October 1823. This morning Mr Janson performed amputation on a woman about 30 years of age, about half way up the left thigh, on account of a scrofulous knee-joint. The thigh and leg were both greatly emaciated; the knee-joint was in a state of demiflexion; the inferior end of the thigh formed a projection inwards, whilst the upper end of the leg formed a similar projection outwards. In performing this operation, M. Janson carried his knife through the integuments and muscles down to the bone, without drawing, or dissecting, back the skin, or waiting for the retraction of the external muscles. The bone consequently was sawn through very nearly at a level with the external incision. The integuments were then pulled down over the bone as far as could be done, and a roller applied from above downwards, to keep them in this situation. The cavity formed by the two lips of the wound was stuffed with charpie and compresses; and over the whole more charpie and another roller were applied.

Febrile symptoms manifested themselves on the second or third day after the operation, and became gradually more severe. The bone was seen to project beyond the level of the flesh at the first dressing, and this projection continued to increase. The secretion of purulent matter was small in quantity, and there was no appearance of the formation of granulations. The surface of the wound was pale and flabby-looking.

8th November. M. Mortier remarked to-day, that, though there is very little appearance of inflammation on the surface of the stump, as manifested by the trifling suppuration, &c. the patient is labouring under a high degree of inflammatory fever; that this must arise from the existence of inflammation in some of the internal organs; and that in cases of external injury inflammation often goes on to a very great extent in internal viscera, without occasioning any symptom that leads to a suspicion of its existence. With regard to the present case, M. Mortier remarked, that there is no reason to suppose the inflammation to be situated in the head or in the abdomen. The patient has slight cough, and complains of some degree of pain in the chest, and we may therefore suspect the existence of pleurisy. She is evidently sinking fast; has the *facies hippocratica*, and complains much of pain during the dressing of the stump.

On proceeding to examine the body after death, the *piamater* was found slightly infiltrated with serum; a small quantity of purulent matter was found on the surface of the right hemisphere of the brain, and on cutting into its substance, three abscesses, each of about the size of a shilling, were found in the superior and posterior portion of the same hemisphere, from three-fourths to one inch and a half below the surface. The two ventricles contained a little water.

On opening the thorax, there was found a quantity of sero-purulent fluid, mixed with flakes of lymph, effused in the left cavity of the pleura. A considerable quantity of lymph, of a very yellow colour, adhered to the *pleura pulmonalis* of the inferior lobe of the left lung. The substance of the inferior lobe of each lung was in a state of inflammation, and contained a number of small points of suppuration. The mucous membrane of the trachea and its ramifications was somewhat inflamed.

The surface of the stump was covered by a layer of lymph-looking matter, and seemed in some parts to be beginning to purse a little round the bone, which protruded at least an inch beyond the level of the soft parts.

In another case which fell under my observation at Lyons, that of a man in whom erysipelas of the arm, succeeding to a bruise in the little-finger, terminated fatally, the brain was found covered by a layer of purulent matter, and an abscess had formed in the cerebellum.

In the third volume of the Foreign Quarterly Journal, p. 294, 5, a case of lithotomy performed by M. Dupuytren is related, in which the patient died in a few days, and inflammation of the chest, with effusion of lymph into that cavity, was found on dissection.

Conclusions.—1. That individuals labouring under a chronic affection of any internal viscus are liable to have an acute inflammatory attack induced in that viscus, by local injuries of remote parts of the body.

2. That inflammatory affections of different organs and textures are liable to occur in individuals who have suffered local injuries, but in whom there is no reason to suppose any disease of these viscera to have existed previously.

3. That different viscera are liable to be affected in different cases of injury of the same part of the body; and that, on the other hand, the same viscera may become affected in cases of local injury of different parts of the body.

4. That in many instances of local injury, pus is effused into remote organs, though suppuration has not occurred in the seat of the primary injury.

5. That the occurrence of affections of remote organs in cases of this nature is generally accompanied by some change in the appearance of the primary injury—as the cessation of the effusion of pus in cases in which suppuration had commenced.

6. That these secondary affections of remote organs occur at very different intervals of time after the reception of the primary injury.

7. That symptoms occasionally occur in cases of this nature, that enable the practitioner to determine which organ is affected,—as cough, when the lungs, and jaundice when the liver, become inflamed.

8. That in most instances, however, the progress of the disease in the remote viscera is very insidious, and affords few or no indications of its existence.

9. That the most probable mode of preventing the occurrence of inflammation in remote organs, subsequently to injury or amputation, is to moderate the constitutional inflammatory tendency, which local injuries produce to a greater or less degree, and particularly to direct these precautions to the organs that may be known to be predisposed to disease, or that show any tendency to become affected.

Art. VI.—*Remarkable Case of Extrophy of the Urinary Bladder, with Remarks.* By P. D. Handyside, M. D., F. R. S. E., Lecturer on Anatomy and Physiology.

Although there are on record many cases, and a few well-digested accounts * of this connate deficiency of the urinary organs, yet, as the appearances of the malformation in the present instance, vary in some interesting particulars from what have been observed in other cases already recorded, I am induced to narrate shortly the details of these peculiarities.

James Forbes, from Campsie, Stirlingshire, aged 42, who since early life has been employed as a gardener, found it necessary eight years ago, to leave his occupation in consequence of severe chronic rheumatism, affecting particularly the articulations of the lower limbs. More lately, he has suffered under a protracted attack of rheumatic fever, accompanied by a severe affection of the articular apparatus of the left knee and hip-joints, which has terminated in luxation of the *os femoris* on the *dorsum ilii*, and consequent shortening of the limb. His constitution was formerly robust, and his body vigorous, though latterly his strength has

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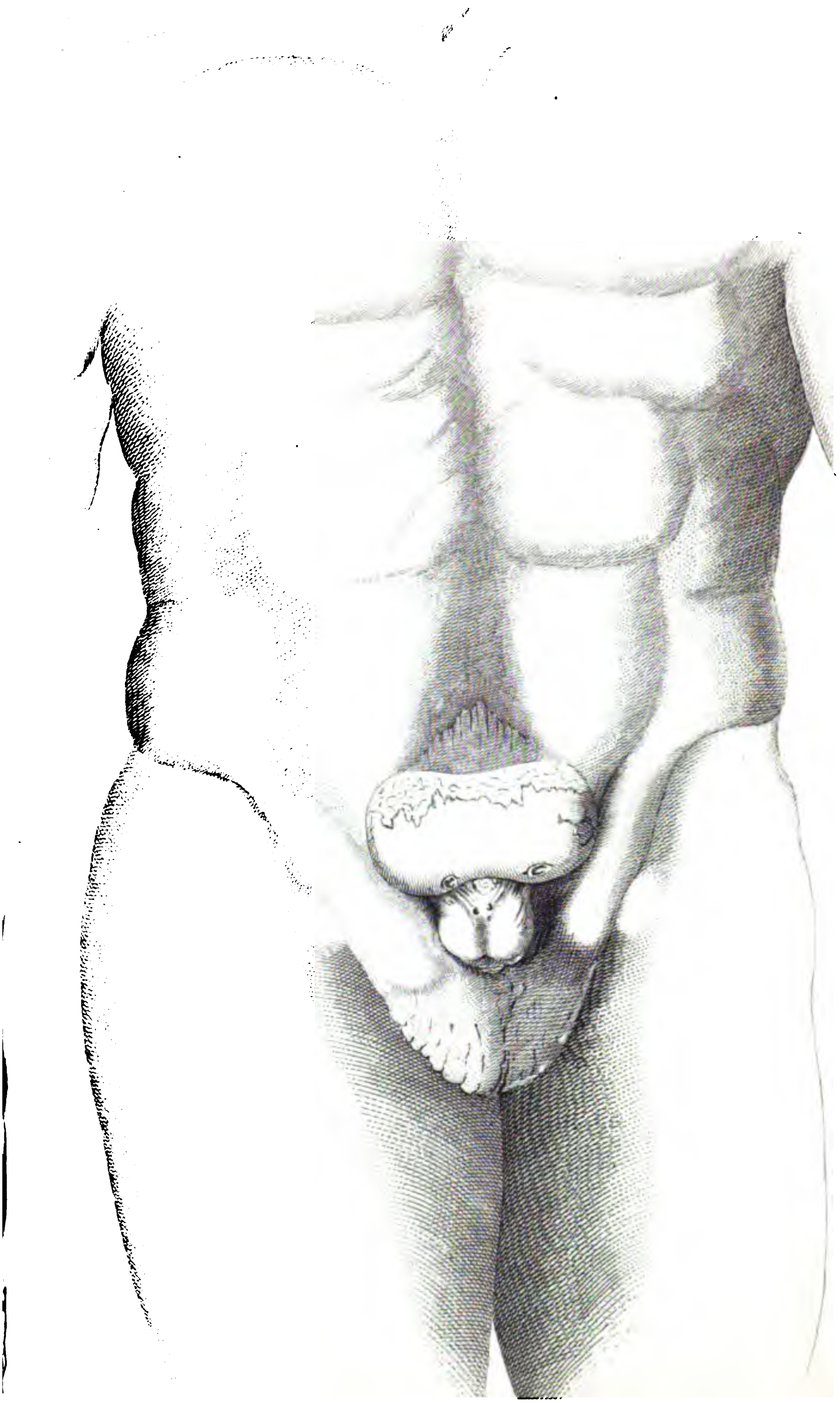
* See Vols. i. p. 39, and iv. p. 32 of this Journal;—Dict. des Scien. Méd. xiv. 344, *Art. Epispadias*;—Cyclop. of Anat. and Phys. *Art. Bladder*, p. 391, &c.

Edin. Med. & Surg. Jour. Dr HANDYSIDE'S CASE. Plate IV, p.422, Vol. III.



become much impaired, and his body emaciated, and now he suffers considerably more than he used to do from a malformation in the genito-urinary organs, a great part of the urinary bladder being everted, and its delicate mucous surface likewise in a very irritable condition.

In height, this man measures five feet four inches and seven-eighths, while between the extremities of his middle fingers, his arms being fully expanded, he measures six feet two inches and seven-eighths. This disparity is remarkable, for although between eight and ten years ago, a curvature forwards in the dorsal region of the spine contributed materially to lessen his stature, yet very nearly the same amount of disproportion in his body was congenital, since we find that his height at the period of maturity did not exceed five feet nine inches.*

At birth the subject of this narration was observed to have in the hypogastric region, a small reddish tumour, to the upper part of which the umbilical cord was attached; but all trace of the latter disappeared very shortly afterwards. He is the oldest of a healthy family of seven, (four of which number are males), and is the only one among his relatives exhibiting any malformation. As he advanced to maturity, the tumour increased rapidly, though not in an equal ratio to what it latterly has done, since eight years ago, it was in bulk one-half smaller in every way than it now is, and about three years ago, when I first saw him, it was one-fourth smaller in size than at present. It now presents the following characters. [See Plate IV.]

The anterior wall of the hypogastric region of the abdomen in the situation of the lower third of the *linea alba* is deficient at a part corresponding to the base or neck of the tumour, which consists of the everted posterior wall and lower fundus of the urinary bladder, protruded so as to form an elongated oval eminence, having its long axis placed transversely. The skin of the abdomen continuous with the upper part of the neck of the protrusion presents a triangular cicatrice two inches and a half broad, by one inch and a quarter in elevation, the base of which unites with the surface of the bladder. The integument closely bordering on the remainder of the neck of the tumour presents a similar opaque and cicatrized appearance.

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* It is perhaps not superfluous here to remark, that, six years ago, I made a series of careful observations with the view of ascertaining the accuracy of a measurement of the expanded human body given by Du Piles, as taken from the statues of the ancients by M. du Fresnoy, and which measure is by artists assumed to be true in nature, viz. that "a man, when his arms are stretched out, is, from the longest finger of his right hand to the longest of his left, as broad as he is long." (See Sir Joshua Reynolds' Works, by Malone, edit. 1809, Vol. iii. pp. 115, 116.) By induction from the first twenty-five experiments of this nature made by me, I found that, at the period of maturity, there is a preponderance in the breadth over the height of the expanded body, amounting on an average to rather more than two inches and a half.

The surface of the extrophied bladder is composed entirely of mucous tissue, with the exception of, *first*, a narrow portion on the upper surface of the neck of the tumour, continuous with the cicatrized skin already adverted to as marking the attachment of the umbilical cord, and *secondly*, an insulated triangular portion of small size on the anterior surface of the left side of the tumour. Both of these spaces are covered with skin and epidermis, exhibit irregularly undulating borders, and resemble old cicatrices. No change in the relative size or general appearance of these spots has been observed.

The mucous surface just referred to is of a florid colour, of a smooth and fine villous appearance when examined under a lens, and it is exquisitely sensitive. For partial defence of this delicate surface it is covered altogether with an exudation of thin mucus. This secretion, however, is, from the high temperature of the part, (afterwards to be noticed), constantly being inspissated, and acquiring the character of loose opaque shreds or laminæ, which in their turn are detached by the mucus effused beneath, so that the surface is, notwithstanding, kept constantly bedewed with this secretion. So sensitive to the touch and to the influence of a cool atmosphere is this surface (which, especially during the prevalence of frost, or previous to its approach, is very delicate and painful,) as to require the individual to guard it from exposure to the air, or to any irritation, with as much care as possible. This he succeeds moderately well in doing by the use of a shield made somewhat after the pattern recommended and figured by Dr Duncan.*

On the lower surface of the protrusion is the well-marked *trigone*, bounding which space posteriorly, and at the distance of one inch and a half from each other, and three-fourths of an inch from the penis, are the apertures of the ureters, the left at the distance of one inch and an eighth, and the right three-eighths of an inch distant from the mesial line of the body. The border of the aperture of each ureter is surmounted by an elliptical projection of mucous membrane, which, from its thickness and obliquity, prevents the free escape of the urine. Nevertheless, this fluid is observed constantly and involuntarily to ooze out of the left ureter, the orifice of which is a little wider than that of the right; while, on the other hand, the upper surface of the penis being in close contact with the latter opening, operates as a valvular hindrance in opposing the free escape of the urine through it. The individual possesses, however, a power of propelling at pleasure a small stream of urine from the left ureter, and when the tumour is gently raised from the penis, he can, by powerfully contracting the diaphragm, abdominal muscles, and *levator ani*, urge forcibly a stream of urine from both ureters simultaneously. This flow of urine is rendered freer by previously dilating the orifices of the ureters, by introducing along them for about half an inch a moderately sized bougie. Beyond this distance these canals appear to be much dilated and very tortuous, constituting apparently supplementary bladders or receptacles for the urine. The correctness of this suppositon I was enabled to put to the proof by plugging tightly the orifices of the ureters on one occasion for the period of two hours, and on another occasion for two hours and a half, so as to confine the urine within the dilated ureters. These experiments (which I repeated) produced in about an hour from their commencement, a sensation of great distension in the upper inguinal regions, and along the spermatic chord, attended with considerable uneasiness and pain, and a manifest recession of the protruded bladder, with a contraction of it in all its diameters. At the close of the experiments, I raised the tumour, and, much to the relief of the individual, removed the plugs, when a very little urine began to flow from each ureter; but on the introduction of my finger along the rectum, and the elevation by this means of what seemed to be a watery sac or dilatation, the urine was discharged abundantly, and exhibited a well-marked straw-colour, whereas, in ordinary circumstances, this fluid is voided quite transparent in appearance. It may be added, that the flow of urine has always been regular and uninterrupted, and the quantity of it discharged in the twenty-four hours amounts on the average to six pounds. Its constituents, however, are not altogether healthy, a sufficient quantity of albumen existing in it to form a precipitate on boiling, and there are present also about ten per cent. of thick and very viscid mucus. Farther, a round soft pellet of a white deposit like moist pipe-clay, of the size of a large pea, and composed of the ammoniaco-magnesian phosphate, entangled in this ropy mucus, has, during the last nine months, been voided along with the urine from the left ureter every morning.

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* See Plate iii. in Vol. i. p. 140 of this Journal.

The ordinary specific gravity of the urine varies from 1009.4 to 1022.1, and the specific gravity of that collected in a vessel between six P. M. and half-past one A. M., amounts to 1020.5. Fifty minutes after having taken one ounce of the infusion of rhubarb, the specific gravity rose from 1009.4 to 1022. Forty minutes after this, (an interval during which the urine was forcibly retained in the ureters by firm plugs introduced into their orifices,) its specific gravity rose to 1020.5;—however, one hour and fifty minutes afterwards, (the ureters having still been kept closed,) the specific gravity of this fluid when forcibly expelled was found to have fallen to 1010.4.

The following are the measurements and external relations of this extrophy of the bladder.

The length or transverse diameter of the tumour when in its ordinary relaxed state, (the individual being seated,) measures four inches and a half, its breadth or vertical diameter two inches and a half, and its depth or antero-posterior diameter, *i. e.* its elevation from the skin of the abdomen, one inch and five-eighths. This last diameter is, however, during any muscular exertion increased to three inches. When the body is placed in the horizontal posture, and is quiescent, the transverse diameter of the tumour is reduced to three inches and a half, the other diameters remaining as before; but after a night's rest in bed, the whole protrusion is reduced to the size of a large plum. When, however, attempts are made in ordinary circumstances, to retract the protruded mass, by calling into powerful action the muscles of inspiration, the tumour appears to be lessened in all its dimensions, its measurements being reduced to these; length three inches and a half, breadth one inch and a quarter, depth one inch. This diminution in its various diameters takes place synchronously with the contraction of the abdominal muscles, and may possibly be referred altogether to their action; yet an attentive observation of the surface of the protrusion during contraction, leads to the more probable conclusion, that in itself it evidences the possession of a distinctly fibrous or muscular coat. Again, upon plugging the ureters, the lower part of the bladder appears to retire or be drawn inwards, and the whole then assumes a collapsed and somewhat corrugated appearance.

A probable reason for the volume of this tumour being so variable is, that internally it constitutes a herniary sac, in which rest many convolutions of the small intestines. These indeed may, during expiration, be readily recognized as occupying this position, by the undulatory movements then perceptible through the very thin and attenuated texture of the parietes of the abdomen, immediately above and around the edge of the tumour.

The subject of this case has never been able to occupy any other posture when laid down, than resting on his back or his right side.

The *temperature* of this everted mucous surface, as indicated by a very delicate thermometer employed in an apartment the air of which was so low as 40°, amounted to 98°, while the temperature of the interior of the ureter (the bulb of the instrument being introduced for one inch and a quarter along the canal,) amounted to 99½° Fahrenheit.

In the present, as in much the greater number of narrated cases of this congenital malformation, a separation anteriorly of the bones of the pubes is found to exist, no symphysis (properly so named) being present. The *ossa pubis* appear in this instance to be present throughout, although the summits of their spine are widely separated from each other to the distance of seven inches and a half, and are apart from the mesial line half that distance.

The *recti* muscles of the abdomen maintain their ordinary attachments to bone, but five inches above the tumour their mesial margins form, with the superior margin of the neck of the tumour, a triangular space, the area of which corresponds with the expanded *linea alba*, and that cicatrized spot formerly described as marking the seat of the umbilicus. The *pyramidales* muscles are of course wanting.

The remaining measurements of the pelvis are the following: Between the anterior superior iliac spines across the hypogastrium, 14 inches; do. on a plane surface, 12½ inches; do. across the last lumbar spine, 16½ inches; between the anterior superior iliac spine and the pubic spine, 5 inches; between the tuberosities of the ischium, 4½ inches. Again, the distance of the *scrobiculus cordis* from the neck of the tumour is 11½ inches; the latter from the pubic spine, 2 inches; from the anterior superior iliac spine, 6 inches; and from the *os coccygis*, 6½ inches.

The *penis* is adherent to the *trigone* of the everted bladder, but the *glans* alone is perceptible, which is cleft and imperforate. In length it is an inch and a half, in breadth two inches, and in depth (laterally to the frœnal cleft) seven-eighths of an inch. The anterior two-thirds of its upper surface or dorsum present a flattened shallow groove or gutter, on which the urine in part falls, and this gutter is terminated laterally by an edge or border about a line in extent. The posterior third is surmounted by a triangular elevation, exquisitely sensitive, resembling and corresponding to the *verumontanum urethræ*. The orifices of the two seminal ducts are situated at three-eighths of an inch distance from each other, and three-fourths of an inch from the side of the penis, and they open on the verumontanum; while on and around this elevation are several mucous lacunæ besides, one of which, placed in front, resembles the *lacuna magna* in its size, and in its extending backwards. The *glans penis* is devoid of præputial covering above, but below it is invested by prepuce, which anteriorly forms a corrugated semilunar frœnum, and laterally is prolonged upon the integument of the scrotum. The glans is capable of erection; in colour it is natural; the verumontanum and urethral groove present also their natural bright rose-tint. The *corpora cavernosa* are not distinguishable. The penis does not arise from bone through the medium of crura, but is attached to a dense ligamentous band, that may be felt by the finger introduced *per anum*, extending transversely across between the ascending *rami* of the pubes. These ridges of bone are four inches distant from each other. Towards its attachment to this transverse band, the neck of the bladder and adjacent portion of the *trigone* may at the same time be perceived drawn inwards and downwards at a very acute angle; and here the amount of thickness of parts between the surface of the abdomen and the finger does not exceed half an inch.

The *prostate gland* during this examination is not to be felt, although very probably it is present, as is manifestly indicated by the existence of a strong sexual appetite.

It is probable likewise that the *vesiculæ seminales* exist, although they too are imperceptible, since a very abundant secretion of mucus is discharged at the seminal orifices.*

The *scrotum* in form is a small, triangular, and elongated pouch; in length, measured from the *frænum præputii* downwards, it amounts to three inches and a quarter, and at its lower half it is corrugated, collapsed, and empty. The *raphé* is well defined. The *testes* are of their natural size; they descended from the abdomen at the usual period, and occupy the base and upper third of the scrotum, where they may be at once recognized, the left one hanging a little higher up, and projecting a little further forwards than the right. Their secretion is regular and natural. The *vasa deferentia* are distinct; they can readily be felt by the fingers, and terminate naturally.

The spermatic cords are large, but no power, such as the *cremaster* confers, of retracting these or the testes towards the abdomen, exists in this case of extrophy. The individual is subject occasionally to hernia on both sides after any great exertion or fatigue in walking, or too laborious employment. He has, however, been less subject to this condition lately, though simply of course from having avoided the cause.

The anus is placed so far as two inches in advance of the coccyx, and only one-third of an inch from the base of the scrotum.

In the second part of this paper, I shall offer some observations on the structure and peculiarities of the mucous surface of the urinary bladder, and notice its secretion. I shall inquire also into the nature of the influence which the bladder is supposed to exert directly or indirectly, in producing certain modifications in the urine. And, finally, I shall detail a series of experiments and results, (for performing and obtaining which this case of extrophy has afforded so favourable an opportunity,) on the rapidity with which various colouring, saline, and smelling substances, &c. after being exhibited, appear in the urinary secretion.

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* See Dr Davy's recent researches on the fluid of the *Vesiculæ Seminales* in Man in this Journal, Vol. L. pp. 12, 13, note.

ART. VII.—*Report on the Epidemic Fever of Edinburgh. An Account of the Symptoms and Treatment.* By WILLIAM HENDERSON, F. R., C. Ph., Lecturer on the Practice of Medicine.

Analysis and Details of Forty-seven Inspections after Death, by JOHN REID, F.R., C. Ph., Lecturer on Physiology.

THE fever described in the following pages has been epidemic in Edinburgh for three winters,—gradually declining as the spring advanced, and almost disappearing in the summer, that of 1836 excepted, in the course of which a considerable number of cases occurred, and it was then that the disease began to prevail extensively. This account of the disease has been constructed from cases which occurred during its last irruption, dating from the end of October 1838 to the middle of June 1839. Within that period nearly 200 cases came under my particular care,—and it is from these, although they form but a small proportion of the whole number admitted into the Royal Infirmary, that the account is derived.

The difficulty of forming a satisfactory diagnosis has been felt in many instances, in which the disease has terminated within six or eight days,—without scope having been afforded for the development of that group of symptoms, which in the second week, more especially, of continued fever distinguishes it widely from every other disease. The very continuance of a febrile state for many days, without apparent dependence on any particular local disorder, is, when other circumstances are wanting or insufficient, a material assistance in guiding to a correct opinion of the nature of the malady, and when this, as well as the peculiar symptoms of continued fever, is absent, as it is in the slighter cases, the diagnosis is very much embarrassed. The symptoms which attend the invasion of the fever, and the subsequent condition of the pulse, the skin, and the tongue, were found to be not uniformly of the same character in cases which were, notwithstanding, eventually on other grounds, ascertained to be cases of continued fever. Yet the symptoms of invasion, the state of the pulse, the skin, and the tongue, were the principal data afforded in the slighter cases, and in the earlier stage of the disease.

To exclude those slighter cases, to deny their intrinsical affinity to the other and severer cases, and to constitute them a different species of fever, are measures which do not appear to be justifiable, nor are they consistent with the custom of some very high authorities. Dr Bateman, in reference to this subject, says, in his account of the fever epidemic in London,—" Its character is greatly varied by the different circumstances in which it occurs, by the age, constitution, and previous health of the patient, by the intensity of the exciting causes, by the situation and season, and by early neglect or mismanagement; but it is not more varied than other febrile diseases, the small-pox, for instance, or scarlet fever, under similar circumstances; and examples of the most distinct modifications which it undergoes are often observed in individuals of the same family. Thus in the instance of a man and his wife, who were brought to the House of Recovery together, the former was affected with the mildest symptoms of fever, which scarcely confined him to bed, and terminated in a speedy convalescence; while his wife was lying in a state of stupor, her skin covered with petechiæ and vibices; in a word, exhibiting the most formidable symptoms of the worst form of typhus. Yet these extreme degrees of the disease manifestly originated from the same cause; and it would be equally unphilosophical to account them different kinds of fever, and give them distinct generic appellations, as in the case of benign and confluent small-pox, which are generated in like manner from one contagion." If the presence of maculæ, red spots, or typhoid eruption, be considered as conclusive of the nature of the disease, though not necessarily a symptom in all cases of continued fever, then I can have no hesitation in deciding that this fever may run its course in a few days; for instances of convalescence have occurred to me on the seventh and eighth days, in which the eruption had existed, without which the diagnosis would have been perplexed as in other slight cases. The eruption, however, is not a usual character of slight cases; but, as may be observed in the account to be given of it, corresponds very generally with the severity of the case, and commonly becomes scanty and imperfect in the less severe cases, while in those of a slight nature it rarely appears at all, though these may have come from the same locality, and even from the same family as the others.

In the frequent absence of pathognomic symptoms in the early stage of fever, and, consequently, in such cases as do not extend beyond this stage, supposing it to comprehend the first seven or eight days, it has been thought proper, in order to determine the nature of those cases, and to exclude trivial disorders, bearing no affinity to continued fever, from being classed along with it,—to require in all the milder cases a correspondence with the majority of the more protracted and severe, in the following respects,—in the symptoms of invasion, and in the state of the pulse, tongue, and skin, (the eruption excepted), as exhibited in the early stage of the latter class of cases. The symptoms which characterized the period of the invasion of the fever were very generally headach, more especially frontal headach, pain in the lumbar region, in the lower limbs, and not unfrequently in either the chest or abdomen; these symptoms were in many preceded for a day or two by languor, dejection, anorexia, and transient chilliness, and accompanied by sensations of cold, in the back particularly, by impaired muscular strength, and mental activity, and, as ascertained in a few cases, by a soft, rather small, and accelerated pulse. For several days after this, even in the milder cases, pains in the head and back, and general soreness continued, while the skin became preternaturally hot and dry, the face flushed, thirst great, the tongue coated, and the pulse more accelerated, ranging in this early stage both in mild and severe cases, indifferently, from 90 to 120 in a minute, seldom much developed in size, commonly moderate in strength, or both small and tense. After the lapse of six or eight days, those symptoms became in the mild cases much modified, the tongue first beginning to clean, sleep becoming calmer and more prolonged, the skin moist and cooler, the evacuations, if previously dark, of a better colour, with other ordinary symptoms of convalescence. In those cases which did not begin to improve so early, the symptoms which have been detailed began sooner or later to be accompanied or succeeded by those indicative of greater muscular prostration, a more disordered state of the secretions, indications of cerebral disturbance or oppression, and impaired vigour of the circulation; while it was very generally among them, in this more advanced stage, that the skin attained its highest temperature. Convalescence in those cases was gradual, as in the others; sudden improvement, and speedy recovery, in connection with abundant secretion from the skin, bowels, or kidneys being extremely rare. In one or two cases spontaneous purging, or copious perspiration, were harbingers of convalescence. More commonly the change was gradual, denoted more by improvement in the nature of the intestinal evacuations than in their quantity, and by decrease of heat, and gentle moisture, than by abundant perspiration.

In giving a more particular account of the epidemic, I have had recourse, as far as the records enable me, to a numerical analysis of the most important symptoms; a method which, though it gives no definite delineation of any particular case, is yet best calculated to impart a general comprehension of a prevalent disease. The same plan is adopted in stating the results of treatment.

1. *Circulation.*—Regarding the state of the circulation, I need not enter into particular details, because its most important feature, strength, will be better understood from what is stated concerning the results of the different plans of treatment, than by the vague terms in common use to denote the sensation imparted by the pulse, concerning which also there is not unfrequently consi-

derable difference of opinion. In frequency the pulse, except in children, rarely rose so high as 140, but in the worst cases; in one adult female, it beat 156 times a minute on the thirteenth day, although no other unfavourable symptom was present, and the case ultimately did well. The common range in the height of the disease was from 110 to 130, the higher amount of frequency being usually the result of a gradual, but not regular, increase from day to day, from the commencement. In a very few cases it rose little above the natural standard.

2. *State of the Head.*—The head was almost universally the seat or source of symptoms in the course of the fever. These consisted of every diversity in degree, from the slightest uneasiness to severe pain, and from mere oppression, languor, and confusion of the faculties, to stupor and violent delirium, with vociferation, and attempts to get out of bed.

Headach.—Among 132 females, the state of the head in regard to pain was carefully noted in 108 cases. Of these, 104 were affected with headach in the course of the disease. Ninety-two of them were known to have had headach at the commencement of the illness; in twelve, the earlier symptoms were not fully ascertained, but the existence of headach was recorded at an after period; in four cases, there was no headach at any time. Of fifty-one cases among the male patients, in which particular notice was taken of the state of the head, forty-nine had headach.

Delirium, &c. in female patients.—In twenty-five females there was a notable degree of delirium; in thirteen much stupidity and indifference to external circumstances approaching to stupor; in fifteen there was deafness; in two considerably impaired vision at the commencement, with intense headach. The remaining cases had either no degree of those symptoms, or, as was commonly the case, were affected with inconsiderable confusion or sluggishness of mind, or muttering and moaning in sleep. Carphology, *subsultus tendinum*, and convulsions were rare; the two former mostly in the cases which ultimately were fatal, the last only once, and in a fatal case. Of involuntary evacuations no precise records have been kept; but, except towards the close of the fatal cases, there were few who could not give notice to the attendants, or express uneasiness when about to evacuate the bladder or bowels. Retention of urine occurred in three, who had no other very unfavourable symptom.

Date, persistence, &c. of these symptoms.—In a few cases headach in some degree continued throughout the course of the disease. It very generally persisted throughout the first week, means having been resorted to for its removal in few before the lapse of that period. The average duration of this symptom, derived from twenty-nine cases, in which the date of its final cessation is specified, was ten days.

The other symptoms pertaining to the head belonged generally to a later date. Delirium began on an average of twenty-one cases about the eleventh day; in only three cases before the ninth ; in the majority between the eleventh and fourteenth. Considerable oppression, approaching to stupor, was later still usually in presenting itself, the average being the fourteenth day.

The disorder of the mental faculties not only occurred at a date posterior to the average term of the headach, but held no particular relation to the pain. Thus, on selecting cases with the severest degree of headach, it appears that in twenty-nine such cases there were twenty-one that had at no period of the fever any cerebral disorder worthy of being noted, while eight had delirium. On the other hand, there were eleven cases of considerable delirium, in which the headach had been of the ordinary kind. In seven cases of delirium the headach had previously ceased; in four it was still present in a slight degree; in several of the others severe headach and delirium cò-existed. The violence of the delirium did not seem to bear any correspondence to the pain, for of six cases of much delirium, with shouting and attempts to get out of bed, and in which the state of the headach could be learnt, in five the pain was slight or gone, in one only severe; while in two cases severe headach co-existed with moderate delirium.

Deafness came on about the thirteenth day commonly; in three, however, it was among the earliest symptoms, and accompanied at the commencement with severe headach. In five others at a later period there was some degree of headach along with the deafness. In six cases the deafness was associated with delirium; in one with a tendency to stupor.

Delirium, &c. in male patients.—Among sixty-six males there were twenty-three cases of delirium, and three of oppression approaching to stupor. Deafness existed in a smaller proportion than among the females; it has been noted in only one case. There was no difference worthy of remark between the males and the females in regard to these symptoms, with the exception of certain circumstances connected with the delirium. The proportion of cases which possessed this symptom was larger among the male patients, amounting to more than one-third of their number, while among the females it was less than one-fifth. The average date at which delirium began among the former was earlier than among the females, or on the tenth day; in nine cases on or before the ninth day. In two cases it had the character of extreme excitement, or furiosity, of which no case occurred among patients of the other sex.

Tremors of the tongue and hands were not uncommon; subsultus in any considerable degree was confined to the fatal cases. Convulsions occurred in one person, a boy of fourteen years old. After headach, with tendency to stupor, for several days, he was seized with convulsive contraction of the upper extremities, convulsive motions of the lower, insensibility and strabismus,—the fit lasting about an hour, and recovery succeeding without relapse.

3. *State of the Digestive Canal.—Of the Tongue.*—In 100 cases among the females an exact account was kept of the state of the tongue. It very early became covered with an increased and altered secretion, white, yellow, or ash-coloured, viscid, and adhering to the surface, becoming commonly thicker and darker as the disease advanced. A dry state of the tongue began chiefly in the second week of the fever, and continued for the most part, without change, until, along with other symptoms of convalescence, the tip and edges assumed a moist and clean appearance, which gradually extended to the rest. The dryness was often confined to the centre of the tongue, extending in a brown streak from the point backwards. In seventy-three cases the tongue was dry at one period of the disease; in twenty-seven it continued moist throughout; and in several of these was at the same time almost quite clean, in cases too which were not always mild, for one with the tongue in this clean and moist state died on the thirteenth day.

State of the Evacuations, &c.—The observations on the state of the tongue and the following on that of the evacuations are applicable, generally, to patients of both sexes. The intestinal evacuations in their most disordered state were very dark, slimy, and offensive; and in a more or less considerable degree they possessed those characters in almost every case, a few only of the mild, and one or two of the protracted cases, having had throughout stools of a light yellow colour. In many at the time of admission into the hospital, the evacuations were consistent, though otherwise disordered: subsequently, either by the use of purgatives from day to day, or, as happened more especially in the advanced stages of the disease in a good many cases, by a spontaneous laxness of the bowels, the evacuations were thin, as well as offensive and dark-coloured. The laxness which occasionally occurred, and which I have not included in the account of diarrhœa, rarely amounted to more than four stools in twenty-four hours, and this state was not often sustained for several successive days, but was only occasional, and every such case had been, at a previous period, freely purged by medicine, and was very commonly subjected to the renewed operation of cathartics, notwithstanding the easy state of the bowels, as long as the discharges were of an unhealthy quality. A change from the unhealthy condition of the evacuations to a yellowish and lighter colour, and less fœtor, very commonly accompanied, or immediately preceded, the indications of convalescence, or rather constituted one of the earliest symptoms of convalescence. In no instance was there a discharge of consistent feces towards the conclusion of the fever; in one case only was there discharge of blood from the bowels.

Among the female patients at the time of their admission, there were thirty-one cases in which the bowels were costive; and seventy three in which they were in an easy state. It was ascertained that twenty-eight of the latter had taken purgative medicine a short time previous to their admission. In all of these evacuations were easily and regularly maintained subsequently by moderate doses of medicine,—some having need of medicine for this purpose less frequently than others, owing to the condition of the bowels already noticed. In five cases there was spontaneous diarrhœa, or evacuation of very liquid stools, six or eight times, or oftener, in twenty-four hours. In two of these cases, the diarrhœa occurred at the beginning of the fever, and was not subsequently remarkable; in one it occurred on the sixth day, but afterwards the bowels required medicine to move them, and the abdomen was neither tense nor painful; one had copious purging on the nights of the eighteenth and nineteenth days of the fever, succeeded by convalescence; in the remaining case there was diarrhœa at the commencement, which was not remarkable again till the close of the disease, and was then accompanied by epigastric tenderness.

In forty-five men the state of the bowels was noted at the time of their admission. In nineteen the bowels were bound, in fifteen they were open from medicine, and in eleven moderately without medicine. Three cases had subsequently diarrhœa,—all very late in the disease. One case was that of a child, in whom towards the close of the fever, a degree of acute gastro-enteritis, with tension and tenderness of the belly, supervened; the other two cases had during the convalescence from fever with the ordinary symptoms, some bloody mucus in the evacuations, accompanied by pain in the abdomen, and some recurrence of pyrexia.

In twelve cases,—all women,—there occurred nausea and vomiting, chiefly at the beginning of the fever. Five of these had also pain and tenderness of the epigastrium.

4. *Pain and tumidity of the Abdomen.*—Forty-six cases among those of both sexes had abdominal pain and tenderness. In twenty-one the pain existed in the epigastric region; in eleven it was not confined to any particular part of the abdomen, and was unattended by any other remarkable disorder of that region; in eight a degree of general tenderness of the abdomen co-existed with tumidity and tension, in only one of which was there diar-

rhœa. Two cases had pain confined to the left iliac region, three to the left hypochrondrium, one to the right side of the umbilicus. Tenderness of the right iliac region was remarked in none. In a good many cases besides those specified, very firm pressure on the abdomen seemed to produce uneasiness, but not in a degree worthy of being recorded.

5. *State of the Respiratory organs.*—The respiratory acts were in a good many cases much accelerated in the advanced periods of the fever, in some to thirty-six or forty times in a minute, without any sign existing of disease in the lungs or bronchiæ. Among the men, there were twenty-five cases with symptoms of a disordered state of the thoracic viscera. Five had cough in a moderate degree without expectoration, two had merely pain in the chest on full inspiration, or on coughing, and eighteen had symptoms of bronchitis. These consisted of cough, expectoration, in some a degree of pain, and the usual catarrhal rattles. In three of these cases, the bronchitis had been present for several weeks before the fever; in eight, the bronchitic affection came on within the first seven days, and for the most part with the first symptoms of the fever. In the remainder, it attracted notice later; in several, not till convalescence from the proper symptoms of fever had begun, and then had the effect of prolonging a state of pyrexia and debility. In only seven cases were the expectoration very considerable, and the bronchitic rattles general. The bronchitis was usually subdued between the eleventh and eighteenth days.

Forty-eight cases among the women had symptoms of disorder in the chest. In fifteen of these they consisted of cough with little or no expectoration, and of pain on full inspiration without the other symptoms. Thirty-three cases had smart, or severe and general bronchitis, often with pain in some part of the chest, or feelings of tightness and dyspnœa, with accelerated respiration. In all these there was expectoration, in many to a very considerable amount,—from ten to twelve ounces in some in the course of a day. In eleven cases the bronchitis came on in the first week of the fever at different periods from the commencement; and in a few it had existed for weeks previously. In six cases it did not occur till between the thirteenth and nineteenth days. Four of the females died of the bronchitis; one of them had habitual bronchitis, and emphysema of the lungs. Pneumonia did not occur in a single case of either sex. One female in an advanced stage of fever with bronchitis presented on the right side posteriorly an impaired sound of percussion, and small mucous or subcrepitous rattles at the same place; but next day, the sound of percussion was natural, and the symptoms generally improved. It was probably inflammation of the smaller tubes, with congestion of the lung. Of the seventy-three cases of both sexes affected with symptoms of thoracic disease, many were affected with some of those symptoms which were referable to the abdominal viscera.

6. *State of the Skin.*—Typhoid eruption. One-hundred and thirty cases of both sexes were specially inspected with reference to this eruption. In one hundred and eight cases the eruption was found; in twenty-two it was not found, six of the twenty-two cases were not admitted till between twelve days and three weeks from the beginning of the fever; therefore, as will appear from what follows, it cannot be concluded that they had not had the eruption at an early period. Of the sixteen cases in which no eruption existed at any time, the greater number were slight cases; one only could be termed a rather severe case, extending to the fifteenth day. This case was not traced to contagion. Several of the other cases, both adults and children, in the place of the typhoid eruption, had petechial stains, which, as is well known, are distinguished from the eruption, by their not being affected by pressure, while the latter disappears for a short time when pressure is made.

Appearance of the Eruption.—The eruption appeared in four different forms, and the depth of colour varied in different cases.

1. The most common figure assumed by the eruption was that of elliptical, and, more rarely, circular spots, not raised in general above the surrounding surface, and from two to four lines in greatest diameter. Spots of this kind were either few and widely scattered, or in various degrees of abundance; when the most numerous being so closely approximated, that three or four might be included within the circumference of a shilling. In the greater number of cases, however, though abundant, they were scattered more widely.

2. A second form of the eruption consisted of punctuations, as if produced by the point of a pen dipped in blood. These punctuations varied also in number. When the most numerous, they covered the surface more completely than the first form; so much indeed in some cases, that at a little distance, the integuments appeared of an almost uniformly florid hue at the parts where the specks were most crowded. Generally they were less abundant than this, and gave an irregularly freckled aspect to the skin.

3. In one case the eruption consisted almost solely of large and intensely florid patches, half an inch in extent, and irregularly shaped. These were a little raised above the surrounding surface. Patches so large were more commonly noticed in very small number, mingled with some other form of the eruption.

4. The fourth distinct form of eruption was the papular. There were but few cases in which papulæ alone existed. In general, they were scantily disseminated through an eruption of another

form. There was nothing different in their appearance from other papulæ. They were of moderate size, like those of the second day of variola, and it was in this form of the eruption alone that desquamation of the cuticle distinctly occurred. They were easily distinguished from elevated elliptical spots, by their decided acumination.

It was not very unusual to find several of these forms of the eruption mingled together, more especially the first and second. Of fifty-three cases in which the figure of the eruption is specially detailed, thirty-two pertained to the first form; nine of these were closely spotted; seven moderately; sixteen loosely; ten were punctuated, six profusely, four moderately; one presented large patches; five were papular; and five were mixed.

Colour.—The colour of the eruption was influenced a good deal by what was natural to the skin. In persons of dark skin, it was commonly dusky or brownish red. On very fair skins, it was sometimes, especially in the beginning, a very light rose colour, deepening usually as the disease advanced. In general it was such as might be represented by a mixture of vermilion and lake, having a preponderance of the former. In a few the tint was somewhat purple; and this colour could be assumed by an eruption that had formerly been scarlet. This was particularly noticed in cases that became suddenly worse, and was a very unfavourable symptom.

Situation.—The trunk of the body presented the eruption much more abundantly and distinctly, in general, than the extremities. The upper part of the chest, the region under the mammæ, and the sides of the abdomen, were the most favourable situations for observing it. In not a few, especially when the eruption was abundant elsewhere, the extremities, particularly the haunches and thighs, were profusely mottled as with a closely set rash. The face was not commonly affected, or the eruption was with difficulty distinguished from the flushing common in the disease.

Time of its Appearance.—The exact period of the fever at which the eruption first presented itself I have been able to ascertain in but very few cases; a circumstance to be ascribed chiefly to the lateness of the general dates of admission into the hospital. In twelve cases only has the first appearance of the eruption been witnessed. In two it happened on the third day, in one on the fourth, in two on the fifth, in three on the sixth, the remaining four severally on the seventh, ninth, eleventh, and thirteenth. The three last dates must be esteemed as rarely witnessing the first appearance of the eruption; for although many more patients were admitted after the first week of the fever was over, than before that event, the eruption could be detected making its first appearance in only three after the eighth day. The other cases had the eruption in process of development at the time of admission; about eighty cases admitted between the third and ninth days of the fever had the eruption already in progress.

Development of the Eruption.—The eruption was commonly developed gradually in the course of several successive days, before reaching its greatest amount. At first the spots were both few and faint in colour, or, if numerous at the earliest periods, still feebly coloured. Their subsequent increase in number and distinctness was usually progressive from day to day, and they attained their complete development after the lapse of periods various in duration. Thus while some had the eruption perfected on the sixth, or even on the fifth day, others known to have had some eruption on the fourth or fifth, did not present it in a complete state before the eighth or the tenth; and in one case, with eruption noticed on the seventh, it was not completed before the fourteenth. This last would appear from the following data to be a rare exception to the general rule. The dates at which the eruption attained its completion have been noted in forty-two cases. In thirty-five of these this event happened on or before the tenth day; twenty-five between the eighth and tenth inclusive; in the remainder between the eleventh and sixteenth days. While the eruption generally occupied, as appears from those facts, four or five days (supposing it to have usually commenced between the fourth and sixth,) in reaching its greatest degree,—there were some instances in which the transition from a faint and scanty condition, to the fullest distinctness and abundance took place rapidly, even in a single day. In one case the report on the ninth day is, "skin since yesterday abundantly covered with a florid eruption of small spots of various sizes;" the increase subsequently was trivial. The eruption was not necessarily abundant, though occupying several days in being completed, any more than it was scanty, though it became perfect rapidly. Thus, to give an extreme case in illustration of the former statement, on the seventh day, one florid spot was noticed on the trunk, on the eighth, three, and on the ninth, six, besides the few that were dispersed on the limbs. In some cases a moderate eruption continued for several days without increasing, and then became more abundant, and in others an eruption that had begun to fade has again become distinct, and even more abundant than formerly. In one after having entirely ceased, it came back in a slight degree.

Persistence of the Eruption.—The continuance of the eruption in a state of completeness was subject to considerable diversity. The date of the first indications of its decline was noted in forty cases; in eleven before the tenth day; in twenty between the tenth and twelfth, inclusive; in one as late as the seventeenth. This, compared with the dates at which the eruption was commonly completed, will leave from two to four days as the ordinary duration of the eruption in its complete state. In some cases, however, the limits of the completed eruption much exceeded this. Five and six days have been observed as the term of this state in some instances. On the other hand, in a few, the whole course of the eruption was very rapid; three days in two cases witnessed its origin and decline. The treatment appeared to exert some influence in shortening the course of the eruption. I have observed early blood-letting succeeded on the fourth day by its decline.

That the spots throughout the whole duration of an eruption were the same, I ascertained in a few cases, by surrounding a number of them with ink. In one case, those spots remained six days, in another seven, undergoing the same changes, merely, as the general eruption was doing.

Fading of the Eruption.—In fading, the eruption occupied an uncertain period. Of twenty-five cases, in which the date is recorded, at which the eruption had entirely disappeared, in nineteen this occurred between the thirteenth and eighteenth days; in one only earlier than the tenth. In the majority the spots continued to fade day by day, until after the lapse of four or five days, there remained but the faintest traces of stains in the skin. The whole was gone commonly about, or soon after, the close of the second week of the fever. From these facts it follows, that the whole duration of the eruption occupied commonly nine or ten days.

Progress of other Symptoms compared with the advance of Eruption.—In twenty-two cases of copious, or considerable eruption, there was an opportunity of observing the correspondence of other symptoms with the progress of the eruption. The result is, that in sixteen cases, the symptoms became aggravated to a greater or less degree in proportion as the eruption advanced, and became complete. The aggravation consisted of increased rapidity of the circulation, heat, and restlessness; and at the more advanced periods of delirium also in some of the cases. A great increase of the eruption in some of those cases preceded the aggravation of the other symptoms for a day, in others, they appeared to be nearly simultaneous. Four of the twenty-two cases died, and were among the sixteen. In one case only of the whole number did improvement in the symptoms correspond with the full development of the eruption. In five there occurred little or no change in the symptoms, on the eruption becoming copious.

Seriousness of Cases compared with the state of the Eruption.—The importance of the state of the eruption as an indication of the seriousness of the fever in individual cases may be learnt from the amount of the mortality among those with much, compared with the mortality among those with scanty, eruption. Sixteen deaths happened among the cases in which the eruption was noted; and in ninety of the whole number, the amount of the eruption was recorded as being copious or considerable, or scanty. In sixty-five cases, the eruption was copious or considerable, and in twenty-five, scanty. Thirteen of the deaths occurred among the former number, and three among the latter. Two of the three had extensive visceral disease of long standing; the one, a mason, of dissipated habits, had the lungs much disorganized by tubercles; the other, a female, had chronic bronchitis and emphysema of the lungs. Of the thirteen, none were known to be such bad subjects for fever; seven of them had an eruption of the most copious kind; in six, it was considerable and general. Another method of ascertaining the relation which existed between the quantity of the eruption, and the severity of the fever, is the comparing the average duration of the disease in the two categories of cases. Thus, in fifty-five cases of abundant eruption, in which the dates of the commencement of the illness and of the convalescence, were ascertained with precision, it appears that the average duration of the intervening period was thirteen days and two-thirds. In the other class, many of the cases were so mild that reports were not taken so regularly as to enable me to ascertain exactly the time at which convalescence began in some of them. In eighteen cases, the dates are sufficient, and show the average duration to have been eleven days and a half. There was extremely little difference between the sexes in these respects. By the commencement of convalescence, I mean the earliest considerable improvement in the state of the pulse, of the evacuations, of the tongue, of the temperature, and of the intelligence.

The convalescence of cases with the eruption in abundance was not so speedily completed as in the other cases. The only data I possess on this subject are the periods which elapsed between the commencement of convalescence, and the time of dismission from the house. The latter, however, is not to be depended on as a criterion of completed recovery, since many circumstances on numerous occasions served to delay dismission totally unconnected with the state of convalescence. I shall not therefore enter at length into these details, but, as a specimen of the difference in question, the following may be given. On taking, without selection, about twenty cases from each class, the average residence in the hospital of those which had a scanty eruption, appears to have been nineteen days, while that of the others reached twenty-five.

Relation between the Symptoms and the Decline of the Eruption.—It appears in a former paragraph, that of forty cases in which the first appearance of decline in the eruption is mentioned, in thirty-one it occurred on or before the twelfth day; and, in order to determine how far the first decided indications of convalescence corresponded with the decline of the eruption, I propose to compare this with the averages ascertained in respect to the date of convalescence. The average date of commencing convalescence, taking all the cases, was the thirteenth day. The average date of commencing decline of the eruption in the forty cases was the eleventh. On inspecting the records of many of the cases, it appears, in accordance with these results, that convalescence was preceded for a day or two by a decline in the colour and abundance of the eruption. When cases were late of assuming the first appearance of convalescence, in them the eruption was prolonged much beyond the average term; thus, in one case not decidedly convalescent before the twenty-first day, the eruption is reported as being fainter only on the seventeenth, still accompanied by hot skin, deafness, and a pulse beating 120. In another, with convalescence commencing on the seventeenth day, the eruption is reported as continuing abundant on the fourteenth; and in a third, convalescent on the eighteenth, the eruption became fainter only on the fifteenth. Nor did these circumstances occur in cases which presented the eruption first at a later period than usual, for in a case convalescent on the sixteenth, which had an abundant eruption on the fifth, it was as distinct as formerly on the thirteenth day. A considerable number of examples might be added; and it appeared a general rule, that when the fever was protracted (independently of the mere supervention and irritation of local disease), the eruption likewise exceeded its ordinary duration.

Petechiæ and Sudamina.—Purple petechiæ, the result of ecchymosis, were frequently present in the second week of the disease. In some cases, they were very abundant, but in very few exceeded the number of typhoid *maculæ*, which commonly existed along with them. One *vibex* only was remarked in the whole number of cases. The petechiæ continued often distinct, though the eruption was declining. Sudamina were observed only in three instances, notwithstanding the frequent and careful inspection of the skin. The cases in which this eruption was noticed presented them on the tenth, eleventh, and thirteenth days.

7. *Ages.*—Among 119 females whose ages were ascertained, there were aged 60, 1 case; 50 and below 60, 3 cases; 40 and below 50, 10 cases; 35 and below 40, 7 cases; 25 and below 35, 33 cases; 20 and below 25, 13 cases; 10 and below 20, 41 cases; 5 and below 10, 10 cases; and one case at 4 years old. Among the men, the ages were ascertained in 42 cases; between 55 and 58, there were 3 cases; 40 and below 50, 5 cases; 35 and below 40, 1 case; 25 and below 35, 12 cases; 20, 1 case; 10 and below 20, 15 cases; below 10, 5 cases.

Age in connection with Mortality.—13 females died; and in 10, the ages were ascertained; of the other 3, 1 appeared above 40; the other 2 between 35 and 40. Assuming these accounts to be correct, the following is the state of the deaths in connection with the ages; 1 died aged 60; 2 between 40 and 45; 3 between 35 and 40; 3 respectively at the ages of 33, 30, and 29; 2 at 23; 1 at 18; 1 at 14. This statement gives a mortality above 35 of 1 in 3½; between 25 and 35, a mortality of 1 in 11; and of 1 in 16, and ½ below 25. These proportions are only approximations to the truth, because of the 132 female patients that were treated before this account of the fever was begun, with the addition of 16 that have been under treatment since, there are 29 of whom the ages were not ascertained.

Among 66 male patients, 7 deaths occurred in the course of the fever; and 2, after the proper symptoms of the fever had subsided, died in consequence of thoracic disease on the thirty-second and thirty-third days, without their ever having been so far convalescent as to have left their beds; while a third, who had recovered so far as to walk about the ward, and, indeed, was quite well on the twelfth day, died on the twenty-fourth of latent double pleurisy, and subarachnoid effusion. Omitting the last case, 9 deaths occurred among the men; one at the age of 58, 3 at 40, 1 at 30, 4 between 20 and 25, inclusive.

8. *Dates, circumstances, &c. of the Deaths.*—Altogether, adding the 16 cases alluded to above, 148 female patients had fever, 13 of whom died; wherefore, the deaths amount to 1 in nearly 11½. Two admitted in a very bad state died in about forty-eight hours after. 4 cases died between the twelfth and eighteenth days with bronchitic symptoms predominant; 3 with predominance of cerebral disorder, much subsultus, stupor, and in one, convulsions; two of these on the ninth and tenth days; the date of the other was not ascertained. One case died of *cynanche membranacea*, extending into the larynx, on the 16th day. Five died between the eleventh and nineteenth, apparently of mere sinking and exhaustion, the most prominent symptom having been feebleness of the circulation, though the powers of the system generally were greatly enfeebled long prior to death. 9 of those fatal cases were admitted between the fourth and eighth days, inclusive.

In 5 of the fatal cases among the men, death was preceded for a considerable time by stupor, in two accompanied by hurried respiration. In two the respiration was chiefly disordered, one having had previously considerable bronchitis, the other without apparent bronchitis, extremely rapid respiratory acts, as many as 80 in a minute, for twenty-four hours before death, the pulse not becoming feeble till within a few hours of the close, and gangrenous spots occurring on the skin. The two cases that died so late as the thirty-second and thirty-third days, had, the one gangrene of the lung around a tubercular mass, pleurisy, and bronchitis; the other, much dilatation of the bronchial tubes, and pneumonia around them. The proportion of deaths among the men, including the two last cases, was 1 in 7½.

9. *Propagation, &c. of the Fever.*—Whether any examples of fever actually occurred without there having been previous intercourse with the sick, we had no means of ascertaining; but at least a fourth of the cases denied exposure to contagion, and ascribed their illness to cold; while about as many could not refer it to either contagion or cold. Of 13 persons who were in attendance in various capacities on the cases described here, six had the fever previously, and four became affected with it for the first time, while officiating about the sick. About one-half of the patients traced their illness to intercourse with others affected with the disease. Cold weather had commonly the effect of increasing the number of admissions, which declined again when the temperature was moderate. These fluctuations were noticed not merely on a general and large scale as on comparing the effects of summer and of winter, but even in the latter season occasional changes of weather, though not persisting above eight or ten days, had the effect I have mentioned.

10. *Treatment.*—The only details into which I shall enter on this subject are those which illustrate the effects of two opposite plans of treatment adopted at different periods of the epidemic. As constituting a general practice at every period, the moderate and steady use of purgatives, the occasional application of leeches and blisters, and the administration of gentle diaphoretic remedies, may be specified. The following details refer to the effects of wine and of blood-letting.

In the course of the first two months of last winter, fifty-two female cases of fever were under treatment. During this period part of the practice pursued consisted of local remedies when pain existed, and of wine, as the disease advanced, when the pulse did not possess any considerable degree of firmness and size, even though not actually weak. The object in view having been, if possible, to prevent a further decline of the circulation, until the fever had attained its natural term of duration. Twenty-nine of the cases had wine in accordance with this view. Twenty-two of these received wine first between the seventh and twelfth days inclusive, one only earlier. The average quantity given at first was four ounces and a-half daily. This was subsequently increased in twelves cases to quantities varying from eight to twelve ounces, eight of these also appeared to require from three to six ounces of spirits daily. The average duration of the cases thus treated was, till the commencement of convalescence, fifteen days and a-half. That of the apparently milder cases which had no wine was less than eleven days. Six deaths occurred in the fifty-two cases, or, deducting a hopeless case, aged sixty, five deaths happened among those who were in no particularly unfavourable circumstances when admitted into the wards,—giving a proportion of one in ten. All the five were admitted before the eighth day of the fever, and, with the exception of one aged thirty-six, were between eighteen and thirty-three years old, and not more deficient in apparent robustness than the generality of females about the same time of life. So many deaths of persons seemingly favourable subjects for fever induced me, subsequently to the end of December, to adopt a contrary course of treatment. Between the end of December and the end of July last, ninety-six females were admitted. Of this number, thirty-six were bled from the arm. The average quantity from each patient was twenty ounces; one of them, from whom but a small quantity could be had from the arm, had subsequently sixty-three leeches applied to various parts. Eight cases were bled to thirty ounces and more, for the most part at two different periods on successive days. One of these lost forty-one ounces; one forty-two; one thirty-eight; two thirty-six; one thirty-three; eight between twenty and thirty.

The circumstances looked for in almost every case as indicative of the propriety of blood-letting were, that the fever should not have been in an advanced stage, the individual not of a delicate or previously enfeebled constitution, the pulse at least firm, whether small or full, and either particular local suffering, or general pains, restlessness, and flushing. In three instances some important particulars of this list were not attended to, and two of them were fatal. The one, though apparently robust, had recently recovered from an illness, and was reported to have been habitually in delicate health, the other was a drunkard, and had been nursing for some months. These were the only deaths among the cases that were bled, giving a proportion of 1 in 18. Five of the 36 cases required wine at a late period of the disease, but only in one were stimulants administered freely; and, with the exception of two, they were bled to less than the average quantity, viz. fourteen ounces and under. Two of the cases that had wine were those that died,—the one on the ninth day with stupor and convulsions, the pulse not remarkably feeble; the other on the thirteenth, with hurried breathing and small soft pulse on and after the tenth. Of the 96 cases, twenty-four which were not bled, had wine from the ninth to the fifteenth day of the disease, two excepted, which had wine on the seventh. The average quantity begun with was three ounces, and in 6 cases only did it exceed five daily; three of these had above eight ounces.

Duration of the Cases.—The average duration of the cases that were bled and recovered, as ascertained in 28 cases, was eleven days and two-thirds, up to the commencement of convalescence. The average of the 24 that had wine was fifteen days.

Deaths.—Of the ninety-six cases, seven died; or, subtracting cases that were admitted after all prospect of benefit from treatment was over, five died, giving a proportion of deaths, resulting from a cautious and sparing use of stimulants, and occasional blood-letting, of 1 in 19, or, including the 2, 1 in 14 nearly.

Dates of the Blood-letting.—Thirty were bled on or before the eighth day of the disease, two as late as the eleventh, one on the twelfth. The two fatal cases were bled, the one on the seventh day to twenty ounces,—died on the thirteenth,—the other on the sixth to fourteen ounces,—died on the ninth.

Ages.—One was aged 49; 35 and below 40 there were 2 cases; 30 and below 35, 4 cases; 20 and below 30, 14 cases; 14 and below 20, 12 cases. The cases that died were aged 23 and 29.

Appearance of the Blood and state of Symptoms.—In 10 cases the blood was natural in colour and the crassamentum firm; in two of these the venesection was practised after the eighth day, viz. on the eleventh and twelfth. Four of them had some cough with much pain of the chest, aggravated by full inspiration before the blood-letting; two had abdominal tenderness; four had chiefly severe headach, general distressing soreness, and restlessness. In 5 the pulse was above 120, small and firm; in the others between that and 90, and of good strength. In all of these cases speedy relief to pain was the consequence of the loss of blood; in two, however, not till the evacuation was repeated once and twice respectively. In one case the favourable change was temporary, and death happened six days after.

In 6 cases the blood was distinctly sizy; in 2 cupped also. Five of them were bled between the fourth and the eighth days; 1 on the tenth. Before the evacuation, 5 had severe headach, and either much general soreness or tenderness of abdomen, or pain of the chest, with cough; 1 had much soreness, oppression, and pain of throat, without headach. The pulse ranged from 100 to 126. mostly small and tense; in 1, 126, and full; in another, 100, and moderate. The effects were in all, after a first or second bleeding, much relief or total removal of the pains, and feelings of oppression; and in 5 the pulse had fallen in frequency on the following day from 16 to 26 beats.

In 4 cases the crassamentum, in other respects natural, presented a greenish or olive tint on the surface. These were bled between the fourth and eighth days, with permanent relief to the previous pains in the head and chest. In 6 cases the crassamentum, though natural in colour, had less firmness than that of healthy blood. Two of these were bled on the sixth day; 1 on the seventh; 2 on the ninth; 1 on the eleventh. Those bled on the two last dates had the crassamentum of the least consistence. With the exception of 2, who were bled with much relief to twenty and twenty-seven ounces, those last cases did not bear venesection well. One died on the ninth day, and in the others, the disease extended much beyond the average of the cases that were bled, for it lasted on an average sixteen days, and one extended to the twenty-first.

Among the men only 13 cases were bled; the average quantity was twenty-five ounces; the largest was forty-six ounces, in the course of four days, which was borne well, and succeeded by recovery. Ten of them were bled on the fourth, fifth, sixth, and seventh days; 2 on the ninth; and 1 on the twelfth, for the first time. Twenty-four ounces were the most taken at one time, and in patients of both sexes, the quantity at each venesection was regulated by the effects, either relief of the symptoms, or feebleness of the pulse. With the exception of one, aged 46, and of another, aged 14, the ages, as far as could be ascertained, were between 18 and 30. Two died, one aged 25, the other 30. The former, a robust man, was bled only to twelve ounces on the seventh day; and on the tenth, the pulse was moderate in strength, and beat 108. Sudden cerebral symptoms came on on the eleventh, and after being furiously delirious for two days, he died comatose. The latter, bled between the sixth and ninth days to forty-two ounces, died on the fourteenth, having had very rapid respirations and delirium, but not a feeble pulse, (beating at 124 and 126,) for two days before his death. He had several gangrenous patches on the integuments of the chest, commencing on the twelfth day. The cases are too few, and the details too imperfect, to render a further analysis of them interesting.

The only other facts connected with the treatment, which are worthy of being mentioned, relate to the means which were used to subdue the bronchitis. When not attended with much expectoration, and when no other circumstances contraindicated the practice, blood-letting, leeches, tartar emetic, and blisters, were the ordinary remedies. In a considerable number of cases, however, the abundance of the secretion appeared to threaten danger, while these remedies were inadmissible, the blisters excepted. Under these circumstances, very great service was derived from the acetate of lead. It was given in doses varying from half a grain to two grains, several times a day, and usually in union with small quantities of the compound powder of ipecacuan, and one or two grains of squill. The effect in restraining the secretion was often apparent in a few hours. In several very severe cases of bronchitis with profuse secretion and rapid breathing, doses of tincture of cantharides, given alternately with the acetate of lead, appeared to hasten the reduction of the secretion. Some of these required a pretty liberal use of wine at the same time.

W. H.

Appearances observed after death.

As superintendant of the pathological department in the Royal Infirmary of Edinburgh, I have had occasion to conduct the *post mortem* examination of a considerable number of fever patients, and I shall endeavour in the following part of this paper to give an analysis of the morbid appearances which were observed. I find on consulting the Statistical Register of the Infirmary, that 2037 fever patients have been treated in that institution within the last fifteen months, and of these, 276, or 1 in $7\frac{105}{276}$ died. Of these 2037 patients, 962 were males, and 1075 were females. Of the males, 160 or 1 in $6\frac{2}{160}$ died; and of the females 116 or 1 in $9\frac{31}{116}$ died. From certain imperfections in the mode of keeping the Statistical Régister, but which are now remedied, the above numbers are not to be considered as quite accurate, but they at least furnish an approximation to the truth. The number of fatal cases which I have personally examined within the period referred to, amount in all to 47. Among these are not included six cases where the patients were seized with some other disease which proved fatal, during convalescence from fever. I may state, that more than 47 fatal cases of fever have been inspected in the Infirmary during the last fifteen months, as I have not included the cases which were inspected during three months when the disease was raging with great severity, as I was absent from indisposition.

Of these 47 fatal cases of fever, 31 were males, and 16 only were females, so that the males form nearly two-thirds of the whole number. The average age of these 47 patients was $35\frac{28}{47}$ years. Of these, six were between 14 and 20 years of age, twelve between 20 and 30, eleven between 30 and 40, nine between 40 and 50, seven between 50 and 60, and two between 60 and 70. The average duration of the disease before death, as calculated from 43 cases in which this was supposed to be ascertained with tolerable accuracy, was 12½ days. The earliest death occurred on the 6th, the latest on the 22d day of the disease.

The brain was examined in 43 cases out of the 47. Of these 43 cases increased effusion of serum within the cranium was observed in 25, or in more than a half. The most common seat of this effusion was under the arachnoid. In five out of the 25 the quantity of serum effused was sufficient to elevate the arachnoid above the surface of the convolutions only at the most depending parts. In other five out of the 25, the effusion of the serum under the arachnoid was slight, but in one of these there was increased effusion into the cavity of the arachnoid; in a second, the lateral ventricles contained nearly three drachms of serum; in a third there was increased effusion into the cavity of the arachnoid, and a considerable quantity flowed from the sulci on slicing the brain; in a fourth, the lateral ventricles were evidently, though slightly, distended with serum; and in the fifth, seven drachms of serum were removed from the lateral ventricles. In 14 cases out of the 25, the quantity of serum effused was sufficient to elevate the arachnoid above the convolutions, not only at the posterior or depending parts of the surface of the brain, but also over the middle parts. In one case out of the 25 the arachnoid was not only elevated above the surface of the convolutions, at the posterior and middle parts of the brain, but also over the anterior or most elevated parts, and the lateral ventricles were also slightly distended. Out of the 14 cases in which the quantity of serum effused was sufficient to elevate the arachnoid at the posterior and middle parts of the surface of the brain, the lateral ventricles contained an increased effusion of serum in five; in one case this amounted only to between two and three drachms; in another case to between three and four drachms; in two cases to one ounce; and in one case to ten drachms. In one of these 14 cases, there was a dark-red spot in the left *corpus striatum*, of the size of a sixpence, apparently produced by great congestion of the blood-vessels, and there was also slight disease of the large arteries of the brain. In those cases where the quantity of serum effused was sufficient to elevate the arachnoid above the surface of the convolutions at other parts besides those most depending, it also flowed out and in many of these in considerable quantity, from the sulci in slicing the brain. The vessels of the brain in all the cases except in one, in which this organ was examined, were well filled with blood, and in many, a greater number than usual of red points presented themselves on the cut surfaces of the brain. In all except in one, the substance of the brain was of natural consistence; and in this case the softening was slight, extended throughout the whole brain, and occurred during hot weather.

With regard to the symptoms which were observed during life in the 25 cases in which an increased effusion of serum was found within the cranium, and recorded in the journals kept by the physicians and their assistants, I find that those which may be supposed referable to the head are the following. In the five cases in which the serum effused was sufficient to stretch the arachnoid above the surface of the convolutions only at the most depending parts, one is stated to have been confused; another was restless, and, according to the report of the nurse, had a convulsive fit the night preceding his death; a third had stupor with tracheal râles two days preceding his death, soon became comatose, and continued so up to the time of death; a fourth had headach on admission with muscular tremor. In the case in which there was no increased effusion under the arachnoid, but where there was increased effusion into the cavity of the arachnoid, the patient is stated to have been restless and delirious the third evening preceding his death, and on the morning of his death had *subsultus tendinum* and muscular twitches. In the case in which the lateral ventricles were slightly though evidently distended, without any increased effusion under the arachnoid, the patient is reported to have been violently delirious, requiring coercion during the night previous to his death. He remained delirious next day, and died in the evening. In the case in which seven drachms of serum were effused into the lateral ventricles, without increased effusion under the arachnoid, the patient when admitted on the eighth day of the disease, and two days before death, complained of headach, and the pupils were contracted.

In the fourteen cases in which the quantity of serum effused under the arachnoid was sufficient to elevate that membrane above the surface of the convolutions at the posterior and middle parts, one had delirium at night, (this was the case in which between three and four drachms of fluid were effused into the lateral ventricles); a second had much muttering delirium during the last two days he lived; a third talked incoherently, and had the face flushed the day before death; a fourth had on the day before and on the day of his death, convulsive movements of head, neck, and shoulders, preceded by a girding headach; a fifth had no alarming symptom until the morning of death, (twelfth of the disease,) when he became completely insensible; a sixth had headach on admission, (seventh day of disease,) for which leeches were applied, and became delirious on the morning of death (seventeenth); in a seventh, the head was pretty clear until the fifteenth day of the disease, which was the second day before death, when she became talkative and incoherent. The pupils were contracted, and the respirations were noisy on the morning of death. In an eighth the patient, three days before death, complained much of headach, and two days before death the pupils were contracted, extremities cold; pulse 92, (formerly 108); countenance anxious, with moaning and delirium at night; in a ninth the patient was comatose, and the pupils were contracted the day before death; in a tenth, the patient was previously subject to fits of insanity, and she was insensible for several days previous to her death; in an eleventh, the patient, three days before death, had much *subsultus tendinum*, and a tendency to stupor, with contracted pupils, (in this case one ounce of serum was removed from the lateral ventricles); in a twelfth, (the case in which ten drachms of serum were effused into the lateral ventricles,) it is stated that he became oppressed and low, and had vomiting two nights previous to death; on the day previous to his death he attempted to get out of bed, and had constant tremor of lower jaw, restlessness, and moaning; he put out his tongue when desired, but gave no other evidence of intelligence; he became comatose at 2 o'clock next morning, and died at 10 A. M. In the case in which the serous effusion extended over the anterior part of the brain, the patient had much muscular tremor for two days before death, and was comatose for several hours before death. In the other cases in which increased effusion of serum was found within the cranium, they appear to have had only the confusion of thought so commonly observed in fever; and it is of importance to remark, that, in one of those cases in which one ounce of serum was effused into the lateral ventricles, and the arachnoid elevated above the surface of the convolutions at the posterior and middle parts of the brain, the symptoms were typhoid, without any marked local symptom.

We have now to inquire if, in the eighteen cases where no increased effusion of serum was found within the cranium, any symptoms presented themselves similar to those we have described as occurring in the cases in which an increased quantity of serum was effused, as it is only in this way that we can ascertain what relation there is between the appearances observed after death, and the symptoms which manifested themselves during life. In one of these eighteen cases, it is stated that she had furious delirium on the second night previous to her death. In a second case, there was much headach and muttering delirium for a few days previous to death; (this was the case in which the brain was unusually pale.) In a third, there was on admission headach, suffusion of the eyes, and flushing of the face; he became comatose on the morning of his death; the face and extremities became livid, with feeble pulse, and he died ten hours after. In a fourth case, there was severe headach on admission, (fifth day of disease, and the fifth before death,) for which leeches were applied to the temples; on the seventh day of the disease, he was drowsy, and the pupils were contracted, and on the day of his death he became comatose. In a fifth case, the patient on admission was unable to give any account of himself; the pulse was quick, and of good strength; the eyes were suffused; the pupils were contracted, and he had slight subsultus; he remained insensible, and died on the third day after admission. In a sixth case, the pupils were contracted, and the patient gradually became more confused and feeble. In a seventh case, the patient was admitted in a drowsy state, the respirations were short and hurried, and she died next day. In an eighth case, the patient was delirious for six days after admission, but became calm three days before death. In a ninth case, there was no very unfavourable symptom until the night of the fifth day of his disease, when he became delirious; the pulse gradually sunk, and he died on the seventh day. In a tenth case, no urgent symptom had presented itself up to the night of the eighth day of the disease; she had remained tolerably quiet after an opiate until 3 o'clock in the morning, when she began to mutter indistinctly, and died in about five minutes. In an eleventh case, the patient had reached the seventh day of the disease without a dangerous symptom, when he suddenly fell back while sitting up in bed, and shortly after expired. In a twelfth case, the patient the evening before death had a convulsive fit, with movements of arms and lower extremities, and distortion of features, which lasted for about ten minutes; she had two similar attacks within four hours; she became insensible after the first convulsive attack, and died next morning. In a thirteenth case, the patient when admitted, the day before death, had muscular tremors, the intellect was confused, and he answered questions imperfectly. In a fourteenth case, the patient was delirious, and attempted to escape out of a window two nights before death, and on the night preceding death he was very restless.

From this review of the *post mortem* appearances observed in the brain after death from fever, and the symptoms with which they were attended during life; and from the contrast we have instituted between those cases where an anormal quantity of serum was found within the cranium, and those cases where the usual quantity only was observed, we think we are justified in concluding, that they afford no distinct evidence that the serous effusion was in all cases, if in any, the cause of death. We have seen one case in which one ounce of serum was effused into the lateral ventricles, and yet nothing different from the usual confusion of thought was observed. We have also seen the cerebral derangement as strongly marked in those cases where no increased effusion of serum was found within the cranium after death, as in those where this was observed. Besides, it must be remembered, that it is not unusual to find increased serous effusion within the cranium in old people, or when the patient has been emaciated by previous disease, in quantities equal to what we have described as occurring so frequently in fever. And this last statement naturally leads us to inquire into the probable effects of age, and the duration of the disease, upon the amount of this serous effusion. I find that the average age of the cases in which an increased effusion of serum was found within the cranium, was $42\frac{21}{33}$ years; while the average age of those in which no increased effusion was found within the cranium was $26\frac{16}{18}$ years. The average age of the four patients in which seven drachms or upwards of serum were found within the lateral ventricles was $57\frac{1}{4}$ years; the youngest being 48, and the oldest 68 years of age. With regard to the average duration of the disease in the two class of cases, we do not find so striking a difference. The average duration of the disease in the cases in which an increased effusion of serum was found within the cranium (as calculated from 24 cases) was $12\frac{22}{24}$ days; while the average duration of those cases in which no increased effusion of serum was observed within the cranium was $11\frac{12}{18}$ days, or only a difference of nearly one day.

It has already been stated that, in most of the cases in which the brain was examined, we observed the blood-vessels well loaded with blood, as indicated by the numerous red points which presented themselves on the cut surfaces of the brain. In judging of the degree of vascular congestion in the brain, we ought to remember that part of the increased quantity of blood in the vessels of the brain may be merely apparent, and arise from the fluid state of the blood; for it is obvious that, if the blood remain fluid, the pressure of the knife used in slicing the brain will force the fluid blood through the open mouths of the vessels upon the cut surfaces.

In judging of the probable causes of the congested state of the blood-vessels of the brain, and of derangements of its functions, we must take into account the state of the respiratory organs; for it is apparent, that if there be any impediment to the passage of the blood through the lungs, this may influence materially the circulation within the cranium, even in those cases where the respiratory function is only secondarily affected through derangement of the central organs of the nervous system; for it is equally obvious that when from this cause there is any impediment to the circulation through the lungs, it will react upon the central organs of the nervous system, and increase the primary derangement. And this leads us to examine the condition of the *lungs* in those cases in which the brain was examined. In the 43 cases in which the brain was examined, the lungs were examined in 39. In the 25 cases in which an anormal quantity of serum was effused within the cranium, the lungs were examined in 23; and in the 18 cases in which no anormal quantity of serum was effused, the lungs were examined in 16. In the 23 cases in which more than the usual quantity of serum was effused within the cranium, the lungs, in 1 case, were scarcely engorged with blood, even at the depending parts; in 3 cases they were found simply engorged with blood at the depending parts; in 1 case the engorgement was combined with the effusion of frothy serum; in 2 cases, with frothy serum and the presence of old tubercles in both lungs; in 1 case with old pneumonia of right lung; in 5 cases with the effusion of frothy serum, and the greater or less quantity of mucus into the bronchial tubes;

and in 10 cases the lungs were congested at the posterior and middle parts with blood and frothy serum, and in some parts were so dense as not to crepitate when cut, and in 3 out of the 10 cases part of the dense portions when cut out sank in water, though they did not present the usual granular appearance of the second stage of pneumonia. Of the 13 cases in which the lungs were examined, where there was no increased quantity of serum found within the cranium, in 8 these organs were simply engorged at the posterior parts to a greater or less extent; in 2 cases this was combined with the effusion of a considerable quantity of frothy serum; in 1 case there was recent pneumonia of the upper part of one lung; in 2 cases the engorged state of the depending portions of the lungs and the effusion of frothy serum, was combined with an increased quantity of mucus in the bronchial tubes; and in 3 cases the posterior and middle parts of both lungs were gorged with blood and frothy serum, and some parts were so dense as not to crepitate when cut. In comparing the frequency of the lesions of the lungs in the cases in which an increased effusion of serum was found within the cranium, with those cases in which this was awanting, they will be found to preponderate in the former, particularly in that kind of lesion last-mentioned, and which it is to be remarked would be attended by great impediment to the free aëration of the blood, and, consequently, to its free circulation through the lungs.

It is probable, however, that the increased effusion of serum within the cranium, and the greater plenitude of the blood-vessels of the brain, occur too frequently to be fully accounted for by the age of the patient, the previous emaciation of the body, and the derangement of the respiratory function, and that it may, in a few cases, be owing entirely, and in others much aided by causes connected with the nature of the disease itself, and by which that disturbance of the cerebral functions so generally observed in fever is induced. The facts which we have stated ought, however, to render us very cautious in attributing the phenomena observed in any individual case of fever, to increased plenitude of the blood-vessels, or to the effusion of serum.

The lungs were examined in 4 cases in which we were not permitted to inspect the brain. In 1 of these they were congested with blood at the depending parts, and a small portion of both lungs was œdematous; in a second case the larger bronchial tubes and a great number of the smaller, were full of puriform matter, and there was a small cluster of old tubercles in the apices of both lungs; and in the 2 remaining cases there was a considerable quantity of frothy and puriform mucus in the bronchial tubes of both lungs. In all, then, the lungs were examined in 43 cases. In 10 of these there was increased effusion of mucus into the bronchial tubes; in 13 cases the posterior and middle parts of both lungs were gorged with blood and frothy serum, and some portions were so dense as not to crepitate when cut, though they did not present any granular appearance; in 1 case a great part of one lung was dense from old pleuro-pneumony; in 1 case the upper and back part of the right lung was in a state of recent pneumonia, passing into the third stage; and in 3 cases there were old tubercles in the lungs. In 15 cases out of the 43, the lungs were perfectly normal, with the exception of a greater or less degree of simple congestion of the most dependent parts. I would have hesitated in classing the case where acute pneumonia running on to the third stage was found, among the cases of fever, and would have been inclined to believe that it was a case of latent pneumonia, attended with typhoid symptoms, or that the pneumonia had occurred during the convalescence from fever, had I not been assured by Dr Peebles, under whose charge the patient had been placed, that the usual febrile eruption on the skin was present, and that the pectoral symptoms came on before any decided signs of convalescence had presented themselves. When fever is prevalent, cases of latent pneumonia in an advanced stage, and attended by typhoid symptoms, are very readily mistaken for continued fever, unless the attention of the physician be particularly directed to the chest. I examined the bodies of three patients within a short time, who had been sent into the Infirmary as cases of continued fever, but, from the appearances observed on dissection, there could be little doubt that they were cases of latent pneumonia which had gone on to the third stage, with very little of the usual pectoral symptoms. In the 13 cases in which the posterior and middle parts of the lungs were loaded with blood and serum, and some portions were so dense as not to crepitate when cut, resembling, as we have elsewhere stated,* the appearances observed after section of the vagi nerves, these anormal appearances were in all probability principally dependent upon the disturbed respiration consequent upon derangement of the central organs of the nervous system, and generally occur a short time before death. This may also arise from the enfeebled action of the right side of the heart, for when the heart's action is feeble, the bronchiæ somewhat obstructed, and the blood more fluid than usual, the right side of the heart is unable to propel the blood through the lungs, it consequently goes on accumulating in the depending parts, and the same results follow as when the respiratory movements are deranged.

From the Journals I find that the following symptoms referable to the derangement of the respiratory organs were observed during life. One had cough before she was attacked by the fever, which continued during the disease, but with no great severity, but the breathing became much oppressed. In a second case the patient had cough and expectoration of long standing. He had been a stone-mason, and had dark hard tubercles disseminated through his lungs. In a third case, the patient had oppression of breathing with mucous râle, and moaning for six days before death. In a fourth case, the patient when admitted on the eighth day of the disease, and the seventh day before death, had cough and expectoration. In a fifth case, the patient, on the seventh day of the disease, and the seventh previous to death, had cough and pain in the chest. In a sixth case, the patient two days before death had stupor, with tracheal râles. In a seventh case, (the case in which the recent pneumonia was observed,) the respirations were very hurried for more than twenty-four hours before death, but no cough was remarked. In an eighth case, the patient on the twelfth day of the disease, and the seventh before death, had some oppression of the breathing, with mucous râles, and the respiration continued oppressed up to her death. In a ninth case, there was cough and expectoration, attended by dyspnœa. In a tenth case, the patient on the second day of admission, and the twelfth day of the disease, was seized with cough, and catarrhal râles were heard in both sides of chest. On the seventh day of admission, and the seventeenth of the disease, the respirations were hurried, the face livid, with loud mucous râles in chest. On the tenth, she ceased to expectorate, and died on the twelfth day after admission, or the twenty-second day of the disease. This patient had been for some years liable to bronchitis on the slightest exposure to cold. It is perfectly obvious that these lesions of the lungs are not the cause of fever, and are not even essential to it; yet they frequently occur during its progress, complicate the disease, and render it more dangerous.

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We next proceed to state the result of the examination of the Abdominal Organs. These were examined in 41 cases out of the 47. In these 41 cases the elliptical patches of Peyer were apparent and distinctly defined in 24, and in 4 of these the solitary glands at lower part of ileum were also distinctly visible. In 6 cases out of the 41, they were indistinctly defined and scarcely visible; and in 11 cases they could not be distinctly recognized with the naked eye. In all the cases in which the elliptical patches were distinctly visible, except in 2, they were of a bluish colour, or rather of a grayish colour, dotted over with dark spots. In 4 cases only were these patches distinctly elevated; in 2 of them this elevation was to no great extent, and limited to a few patches. In 2 only were these elliptical patches very distinctly elevated, and presented any appearance of ulceration. The appearance of the elliptical patches, which we have described as most commonly observed,—viz. of a grayish colour with small dark dots on the surface, and without any distinct elevation, and no appearance of increased redness or ulceration,—is not peculiar to fever, but is not unfrequently observed in various other diseases, though not with the same frequency in other diseases as in fever. Some of the cases in which the elliptical patches and solitary glands were not visible had been actively purged during the progress of the disease by doses of calomel and jalap. On calculating the average duration of the disease in the cases in which the elliptical patches were visible, and comparing the result with a similar calculation of the duration of the disease in those cases in which the elliptical patches were not visible, I find that there was not any great difference in the average duration of the disease in the two classes of cases. In the cases in which the elliptical patches were visible the average duration of the disease was $13\frac{23}{24}$ days; and the average duration of the disease in these cases in which they were not visible was $11\frac{2}{11}$ days, or a difference of nearly 2 days. The average age of the two classes of cases was nearly the same. Out of the 11 cases in which the elliptical patches were not visible 2 only were females. The mesenteric glands were distinctly enlarged in 2 cases only. In 1 of these they were at the same time softened, in the other they were nearly of their usual consistence. We have already stated that in 2 cases only out of 41 in which the intestinal canal was minutely examined, were the elliptical patches of Peyer very distinctly elevated and ulcerated. As the lesions of the intestinal canal, observed in fever, have excited considerable interest and discussion, we shall describe these two cases more in detail. One of these was a male, aged 25 years. On admission, he stated that he had left the county of Sligo (Ireland) eleven days before, and that he felt rather unwell at that time. When admitted his skin was hot and dry; pulse frequent; countenance depressed; bowels constipated. On the evening of the second day of his admission he was very delirious, and made an attempt to escape through a window, and cut his face considerably. Pulse 96; tongue dry; had a dose containing a drachm of sulphate of magnesia, one ounce of infusion of senna and one drachm of tincture of jalap, without any effect. Had much restlessness during the evening of the fourth day of his admission, and died next day. The bowels were not opened freely until shortly before death, when he had taken, besides the above-mentioned cathartics, two colocynth pills, half an ounce of tincture of senna, and had an assafœtida enema. He made no complaint of abdomen. The body was inspected twenty-four hours after death. No increased effusion of serum was found within the cranium. The elliptical patches of Peyer were very distinctly elevated over an extent of twenty feet of the small intestines, and the solitary glands over an extent of five feet, both measurements commencing at the ileo-cæcal valve. These elliptical patches were of a gray colour, with a greater or less tinge of red at different parts, and at some places projected $\frac{3}{24}$ of an inch above the surrounding healthy mucous membrane. At the lower part of the ileum the elliptical patches were irregular on the surface, and presented several superficial and ill-defined depressions (ulcerations.) About two feet above this they appeared somewhat flocculent on the surface, and were studded with numerous small rounded depressions. At the upper part of the ileum their surface was covered with a number of dark gray dots, without any distinct depressions. On making a longitudinal section of these patches through the whole thickness of the intestinal tube, the texture of the peritoneal and muscular coats were unchanged, though the latter appeared somewhat thickened at the seat of some of the patches; and that part of the cellular coat which lay next the muscular also presented its normal appearance. A mass of a grayish colour, with red lines indicating blood-vessels ramifying through it, adhered to the inner surface of the cellular coat, and projected into the cavity of the intestinal canal. On attempting to trace the mucous membrane over the surface of these morbid masses this was found to be impossible, and no distinct line of demarcation could be observed between the mucous surface and the morbid masses. It required some slight force to break up these enlarged patches with the nail, and they were softer on their inner surface than in the interior. The solitary glands were nearly of the size of split-peas, also of a grayish colour, and not ulcerated on the surface. The mesenteric glands were considerably enlarged,—the largest measuring $1\frac{2}{12}$ inch in length, the same in breadth, and $\frac{6}{12}$ of an inch in thickness, the next largest $\frac{10}{12}$ of an inch in length, and $\frac{3}{12}$ in thickness. They were of a grayish colour, with small yellowish masses disseminated through them, and they could be broken down by a comparatively slight force.

The other case was a girl, aged 15 years, who was admitted on the tenth day of the disease, and died on the twenty-second. She had no diarrhœa during her illness, but the bowels were easily moved by laxatives. Two days after admission, she was seized with bronchitis, which was the most prominent local affection during the remainder of her disease. The elliptical patches of Peyer at the upper part of the ileum were defined of a bluish colour, but without any distinct elevation. About a foot above the *caput cæcum*, one of the elliptical patches was distinctly elevated, and of a red colour. A similar patch was placed immediately below this. About five inches above the termination of the ileum, another patch presented itself, more distinctly elevated than the two last described, of a grayish colour, and having two small superficial ulcers on one of its margins. Immediately below this was another patch still more elevated, also of a grayish colour, with several superficial ulcers on its surface. The lower part of the ileum was occupied with a large irregular patch, less elevated than the last described, partly of a reddish and partly of a gray colour, and presenting several irregular superficial ulcers on its surface. Several of the solitary glands at the lower part of ileum were also enlarged, and some of them were ulcerated on the apex. The mesenteric glands were enlarged, but were little, if at all softer than usual.

On examining the Register of Dissections, kept by my predecessor, the late Dr John Home, I find that, between 1833 and the beginning of 1837, the post mortem appearances observed in 101 cases of fever have been entered, in which the abdominal organs were examined. Of these 101 cases, the elliptical patches are described as being well defined or enlarged in 29. In 7 of the 29 a greater or less degree of ulceration of the patches was observed; and in 2 out of the 7, perforation of the intestines had taken place.

It is an interesting and instructive fact, that, though lesion of the intestinal canal is comparatively rare in the fever of Edinburgh, at least for the last several years, the form of fever, as far at least as the post-mortem appearances are concerned, described by Louis and Chomel, is to be found thirty miles from Edinburgh, at Anstruther in Fifeshire. My friend, Mr John Goodsir, Junior, has shown me several preparations of this kind, which he has procured in the course of his practice there, and has furnished me with the following details.

Within the last five years, he has attended in Anstruther and its neighbourhood about 100 cases of fever annually. It is there comparatively a mild disease, for of these only about 16 died. He succeeded in procuring a post-mortem examination in 10, and in every one of these, the elliptical patches of Peyer, and the solitary glands at the lower part of the ileum, were elevated and ulcerated, and in 4, perforation of the intestines had take place. The symptoms attending this form of fever are, lassitude, pain of back and limbs, at the commencement; afterwards the pulse ranges from 90 to 110; there is ringing in the ears, but seldom delirium; a tendency to looseness, but seldom diarrhœa; generally heat in abdomen and groins, and uneasiness on pressure over the right iliac region, seldom amounting to pain; strong pulsation in iliac arteries; generally tympanitic swelling of abdomen; and more or less bronchitis. The greater number of fatal cases occurred in individuals from 13 to 20 years of age. Mr Goodsir has observed the morbid alterations of the elliptical patches of Peyer to pass through the following stages: 1. They are merely slightly elevated, exhibiting an undulatory surface; 2. A number of bluish dots appear on their upper surface; 3. These dots coalesce into a slough; 4. The slough assumes the form of a cake from one-fourth to one-eighth of an inch in thickness; 5. This cake begins to separate around the margin, so as to exhibit a subjacent ulcer; 6. The cake is separated; the last point of adhesion between the cake and subjacent parts being sometimes at the centre, at other times at one of the edges. The solitary glands undergo the following changes: 1. Slightly elevated; 2. Like a split-pea; 3. Rough appearance on the surface of the elevation; 4. Slight slough on the surface; 5. The central substance drops out, and leaves an ulcer with a hard base. In all these cases, the mesenteric glands were enlarged and softened. In the four cases in which perforation had occurred, this was found to arise from the ulceration of one or more of the solitary glands. The disease was confined in general to the lower three feet of the ileum.

The only other anormal appearances in the intestines which we observed in the 41 cases we have examined were the following. In one case, there were a few ecchymosed spots in jejunum, and in upper part of ileum. In another case, there was a morbid gray elevation adhering to the mucous membrane, about half an inch in breadth, and extending round a considerable part of the calibre of the upper part of the ileum. In a third, there were some old cicatrices at the lower part of the ileum, and there were numerous circumscribed red spots on the mucous surface of ascending and transverse colon, without any decided change of the consistence of the membrane. In a fourth, there were a number of small depressions, with surrounding redness, in the mucous membrane of the *caput cæcum*, ascending, transverse and descending colon. In a fifth, there were a number of small depressions, without surrounding redness or thickening in *caput cæcum* and ascending colon. In a sixth, there were numerous small red patches scattered over the inner surface of the ascending and transverse colon, with slight sponginess and elevation of the parts reddened.

Out of the six patients who died of other diseases while convalescing from fever, the abdominal organs were examined in four. One died on the thirty-first day after the commencement of the disease; another on the twenty-seventh day; a third, on the twentieth day; and the fourth on the thirty-third day. In the three former, there were no cicatrices of ulcers at the lower part of ileum; and in the last, the elliptical patches of Peyer were of a uniform dark-red colour throughout the whole tract of the ileum, were distinctly defined and elevated, irregular on the surface, and at one or two points presented traces of incipient ulceration.

In nine cases only out of the 24 in which the elliptical patches were distinctly visible, were there any abdominal symptoms during, life and in some of those cases these certainly could not be referred to any affection of the elliptical patches of Peyer. In one of these the patient had retching and diarrhœa on the fifth day of the disease; this soon subsided, and he died on the 18th. In a second there was epigastric tenderness and tympanitis on the seventh day of the disease, and he died on the tenth. In a third the abdomen was distended and tender. In a fourth there was diarrhœa the day before death. In a fifth there was diarrhœa on the eighth day of the disease, (died on the seventeenth,) and the abdomen was slightly tender on pressure. A sixth had four stools without laxatives two days before death. A seventh had diarrhœa on the eighth day of the disease, which continued up to the time of death, which took place on the fifteenth. An eighth had a tendency to diarrhœa, the bowels being easily and repeatedly moved by laxatives. A ninth, (the case in which red patches in ascending and transverse colon, with slight sponginess and elevation of the parts reddened, were found,) had five stools without medicine the day before death, In the case in which there was diarrhœa for several days before death, there were numerous small ulcers in the large intestines.

In one case in which the elliptical patches of Peyer were not visible, the bowels are stated to have been rather loose, the stools watery and dark-coloured. In other two cases there was considerable abdominal tenderness without diarrhœa.

The following lesions of the *stomach* were observed in the forty-one cases in which the abdominal organs were examined. In three cases the mucous membrane was thickened and mammillated at the pyloric and middle portions. In a fourth case, the mucous membrane of the pyloric extremity of the stomach was slightly mammillated, and it was softened at its splenic extremity. In a fifth case all the coats of the stomach were corroded at the splenic extremity by the action of the gastric juice, and an aperture was found there capable of admitting the points of three fingers. In a sixth the mucous membrane was everywhere thickened, mammillated, and firmer than usual. In a seventh case, the mucous membrane of the stomach presented numerous rounded superficial depressions, with defined margins without thickening or increased redness. In an eighth case, the mucous membrane along the larger curvature near the pyloric extremity was of a red colour, friable, covered with a thick layer of mucus, and presented several small rounded depressions surrounded by a bright-red margin. In a ninth and tenth case, the gastric juice was found to have acted after death to a considerable extent, upon the mucous coat of the stomach at its splenic extremity.

In those cases in which the mucous membrane of the stomach was thickened and mammillated, it was ascertained that the patients had laboured under dyspeptic symptoms for some time previous to the commencement of fever.

The *spleen* of all the organs in the body was found most frequently in an anormal state, being generally larger than usual, soft, and in some cases almost diffluent. In two cases the spleen was weighed, and in one it was eleven ounces one drachm, and in the other fourteen ounces. In some of the other cases it must have been heavier. In three cases, however, I find it described as presenting its most usual appearance and consistence, and in other two cases it was not increased in size, though perhaps it was softer than usual.

Out of the forty-one cases in which the abdominal organs were examined, the kidneys were found more or less affected with Bright's disease in six: and the *liver* was more or less altered from its normal state in five. In one case in which the liver was apparently quite healthy, the patient had jaundice for two days before death. This had arisen from an arrestment of the secretion of the bile, as all the ducts were quite pervious. These anormal changes of liver were of old standing.

In three cases out of forty-three, the *heart* was in an anormal condition. In one case the inner surfaces of the pericardium were universally and firmly adherent; in another case the arch of the aorta was dilated with calcareous depôsit on its inner surface, and the left side of the heart was somewhat hypertrophied; and in a third case the free edges of the aortic semilunar valves were thickened, but sufficient for the performance of their functions. In one case there was recent inflammation of the *larynx.*

In all the cases the *blood* appeared to be in a fluid state, or nearly so, in the large veins, but in several, a greater or less number of coagula, generally, however small and soft, were found in the right side of the heart. In two cases the blood was found in a grumous state in the right side of the heart; in one case the right side of the heart contained some dark-coloured coagula; and in fifteen cases it contained dark-coloured intermixed with decolorized coagula. In two of these cases decolorized clots were also found on the left side of the heart. In several of those cases in which the blood is considered to have been fluid, a few small coagula were found adhering to the *chordæ tendineæ* and *columneæ carneæ* of the right ventricle.

JOHN REID.

PART II.

CRITICAL ANALYSIS.

Art. I.—*Urinary Diseases and their Treatment.* By Robert Willis, M. D., Physician to the Royal Infirmary for Children, &c. London, 1838. 8vo, Pp. 408.

From the earliest ages, the indications of disease to be drawn from the varying appearances of the urinary discharge seem to have attracted much attention. Hippocrates, Galen, Avicenna, Paracelsus, Heurnius, dwell at considerable length on this subject; and it is a circumstance not a little surprising, that these physicians should have been able not only to predict the probable results, but actually to foretel the approach of disease, and what particular organ would be most affected, from the close and careful examination of this excrementitious fluid alone. In an age when they had not the lights of chemistry to guide them, it was not to be expected that the treatment pursued in urinary diseases could have arrived at much perfection; nor does it appear from recorded observations that it had; but as a sign of threatening disturbance to some function or particular organ, of the approaching fatal termination or solution of disease, they seem to have gone further than even the moderns, with all the aids which chemistry has afforded. To be satisfied of this, we have but to peruse the works of almost any of the older authors, and compare them with those of the most enlightened of the modern writers; and, laying chemistry aside, we find that the peculiar appearances of the urine, its colour, its odour, its sediment, &c. are described by them with a minuteness and precision for which we in vain look in the works of later physicians.

In former times the physician made himself particularly acquainted with the appearances of the urine in every class of diseases; and in all the cases narrated by the older authors, these appearances are carefully noted.* To have a thorough knowledge of the varied appearances of the urine in health and disease, was considered so essential to the professors of the healing art, that many eminent authors have devoted their talents to the composition of learned treatises "de Urinis." It seems only necessary to mention the names of Theophilus,[*] Untzerus,[†] Vassæus,[‡] Argenterius,[§] Schmid,[||] Bellini,[¶] Willis,[**] Muscovius,[††] &c. to prove this. The host of writers, in fact, on this subject, incidentally or directly, is immense.

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* Vide Hippocrates, Galen, Avicenna, and Paracelsus, *passim*.

The examination of the urine, as indicative of disease, was indeed so much an exclusive object of attention to the ancient physicians, as to draw down upon them the ridicule of the Poets. In the comedies of Aristophanes this practice is alluded to; and even in comparatively modern times, and in our own country, the greatest of dramatists has recorded the fact as practised by British physicians.—In Shakspeare's Henry IV., Falstaff is thus made to address his page:

"Sirrah, you giant! what says the doctor to my water?"

"*Page.* He said, Sir, the water itself was a good healthy water; but for the party that owned it he might have more diseases than he knew for."

The attention paid to the appearances of the urine, indeed, by the regular physician would appear at an early period to have induced a few to devote their whole attention to this subject, and in some of the older books we find these distinguished by the name of *Uromatici;* but the practice of treating diseases from the appearance of the urinary discharge would seem to have afterwards fallen into the hands of quacks; and as this probably told against the pocket of the regular physician, we are not surprised to find some distinguished members of the profession endeavouring to prove the fallacy of trusting to the appearances of the urine alone as a mark of disease, and launching their anathemas against the *Uromatici.* Amongst these we find Bellini, Schmid, Rega,[‡‡] &c.

About the end of the seventeenth and the beginning of the eighteenth century, physicians were beginning to neglect the indications presented by the urine; and, accordingly, in the writings of this date, much less notice is taken of the appearances of this discharge in disease than at an earlier period. The modern discoveries in chemistry, however, gave a new impulse to this branch of medicine; and the numerous works and celebrated names connected with the chemical examination of the urine and urinary deposits since that period, have placed the knowledge of urinary diseases on a more satisfactory basis than it had ever before attained. By the labours of Wollaston, Marcet, Brande, and Prout in this country, and those of Berthollet, Berzelius, and Gay-Lussac abroad, much accurate information on the pathological states of the urine, and their indications of the state of the health, has been acquired. The treatment, founded on chemical knowledge, is pursued with a degree of success quite unknown in former times. But, as above remarked, the general indications to be drawn from the appearances of the urine before or during disease and convalescence, are not at present better understood than they were centuries ago, nor do they receive the degree of attention to which they are entitled. The work of Dr Willis, however, of which we now proceed to give some account, will, there is little doubt, be the means of drawing more attention to this hitherto neglected indication of deranged functions and disordered health.

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[*] Theophili celebris medici, de exacta recrementorum vesicæ cognitione volumen. Per Albanum Durinum Vitodurensem latinitate donatum. Basileæ, 1533.

[†] Mathiæ Untzeri, tractatus medico-chymici septem &c. Halæ Saxonum, 1534.

[‡] De Judiciis Urinarum tractatus, &c. Joanne Vassæo Meldensi autore. Venetiis, 1549.

[§] Joannis Argenterii de Urinis liber, 1591.

[||] Uromaticus castratus, sive Tractatus de Urinis, &c. a Joanne Schmidio, M. D. Trajecti ad Rhenum, 1697.

[¶] De urinis et pulsibus, de missione sanguinis, &c. opus Laurenti Bellini. Francofurti et Lipsiæ, 1685.

[**] Thomæ Willis, Opera omnia, studio et Opera Gerardi Blasii, M. D. art. de Urinis. Amstelædami, 1682.

[††] De calculo renum et vesicæ. Henricus Ernestus Muscovius. Jenæ, 1689.

[‡‡] Henrici Josephi Regæ, Tractatus duo de Urinis, &c. Francofurti et Lipsiæ, 1761.

Dr Willis introduces his subject by stating the normal function of the kidney, and its use in the animal economy, for the elimination of certain effete particles, no longer fitted to form elements in the organism. Recent inquirers have done much to illustrate the functions of the kidney; and it appears that, in almost all classes of animals, certain organs are provided for the elimination of nitrogen. In fact, this excretion of nitrogen would appear to be nearly as necessary as that of carbon for the proper functions of animal life being carried on; and the discovery of the uses of the Malpighian canals in the class INSECTA, and the *saccus calcareus* in the class MOLLUSCA, which in these animals secrete uric acid, and in which even small calculi of that acid have been found, go far to prove the importance of their functions. Even in those tribes lowest in the scale of creation, where no traces of an organ to supply the place of the kidney have been met with, there is little doubt that some structure will be found to exist which performs similar functions.

A fact of the highest interest to the physiologist, but which has been somehow or other almost completely overlooked,—that the principles thrown out by the lungs and kidneys represent very nearly the sum of that of the aliment introduced into the system, —was first pointed out by M. Chossat * of Geneva in the year 1825; and the same fact, without any apparent knowledge of M. Chossat's discoveries, was last year again brought before the notice of the public by Mr Grisenthwaite. † With regard to the elimination of nitrogen, for that alone concerns us at present, it may be stated, that M. Chossat found that each ounce of bread yielded regularly 9.9 grains of solid urinous excrement; each ounce of albuminous food, 13.6 grains; and each ounce of fibrinous food, 17.3 grains; or very nearly in the relative proportions of 5, 7, and 9. This he found to be nearly the absolute quantity of azote which each of these aliments furnish, and which appears to be thus thrown off by the kidney. M. Chossat, indeed, ascertained that ten-elevenths of all the azote furnished by the food were discharged by the kidneys. Mr Grisenthwaite, in proving that the nitrogen of the food does not go to furnish materials for the nourishment of the body, arrives at the same conclusion, viz. that the nitrogen of the food is all thrown off by the kidneys.

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* Journal de Physiologie, Tom. v. p. 65. Paris, 1825.

† An Essay on Food, &c. By W. Grisenthwaite. London, 1838.

These facts exhibit in a new light the importance of the kidneys to the animal economy, and at once explain the serious and alarming symptoms which ensue on any disturbance to the normal performance of their functions.

Dr Willis minutely describes the anatomical structure of the kidneys, and gives his reasons for arriving at the conclusion, 'that they are organs both of separation and secretion; not exclusively belonging to either class, but performing the functions of both. The experiments of Naveau,* Krimer, † and Brodie, ‡ are quoted in proof of the influence of the nervous system over the secretion of urine; but as several of these results have been recently called in question by Brachet, § it is to be hoped that physiologists will direct their attention to this subject.

The urine, the fluid secreted by the kidneys, varies greatly in quantity and quality, being much regulated by the quantity of food and drink consumed; but the author considers thirty or forty ounces as about the average quantity passed by men during a temperate state of the air. Women generally pass somewhat less, and this is supposed to depend on their more abstemious mode of living. The nature of the food, too, is observed to influence the quality as well as the quantity of the urine. That passed after light unstimulating meals, with which considerable quantities of fluids have been taken, being of a lighter colour, and of less specific gravity, has generally received the name of *urina potûs*; whilst that which is secreted after the process of digestion has been completed, being smaller in quantity, of greater specific gravity, and darker coloured, has been called *urina sanguinis.*

Dr Willis from his own observation regards the density of urine amongst grown individuals to be, as nearly as can be estimated, 1.015; but if children be included, an estimate somewhere about 1.012, will, he believes, be found to be very near the truth. This agrees very closely with that stated by Dr Prout, * who estimates its average specific gravity at 1.0125. Drs Christison and Gregory, † however, also from their own observation, found the average density of healthy urine to be 1.024 or 1.025. It appears very difficult to reconcile these different results; and it is much to be regretted that such discrepancies occur; for until this point be settled we have no fixed standard of comparison, and the value of the density as a test is much lessened. It can scarcely be allowed that the fault lies in the instruments employed for ascertaining the density, since the modes of arriving at this result are various, and would correct each other. The only manner in which it seems possible to account for the discrepancy is, that Drs Prout and Willis have stated the average density of the urine passed in 24 hours, whilst Drs Christison and Gregory have confined theirs to that urine which is passed when the person first rises in the morning, which is known to be of a much higher density than that passed during the day.

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* Dissertatio circa Urinæ secretionem. Halæ, 1818.

† Physiologische Untersuchungen. Leipsic, 1820.

‡ Philosophical Transactions, 1818.

§ Rech. Exper. sur les fonctions du systeme Nerveuse ganglionique. Paris, 1837.

After expressing his regret that we possess so very few quantitative analyses of the urine, the author notices in order the various solid ingredients met with in that fluid. Urea, with its sensible and chemical qualities, as also its elementary composition, is minutely described. Uric or lithic acid is mentioned with equal minuteness. After noticing its sparing solubility, the author endeavours to explain how it happens that the urine holds in solution the large quantities occasionally met with; and he is inclined to attribute a good deal to the fact, that the combination between the lithic acid and the water must take place at the moment of secretion. This explanation of the circumstance, which appears to have been suggested for the first time by Dr Willis, together with that of Dr Duvernoy‡ of Stuttgardt, who from actual experiment proved it to depend on some principle in the urine, which he refers to the odoriferous colouring principle, seems sufficient to account for the fact, the more so, as Dr Willis very justly remarks, because "when the urine contains any lithic acid dissolved, the deposit of the substance from the menstruum is a mere matter of time; sooner or later it always happens." Lactic acid, the author considers as probably a necessary constituent of the urine, derived, as Berzelius supposes, from the mucus, in which it exists in large quantity. The free acid of the urine is generally considered to be the lactic.

On looking over the experiments which are intended to

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* Inquiry into the nature and treatment of gravel, calculus and other diseases. London, 1825.

† Edinburgh Medical and Surgical Jonrnal, Oct. 1829 and Oct. 1831. Also On Granular Degeneration of the Kidneys, &c. By Robert Christison. M. D. &c. Edin. 1839.

‡ Chemisch-Medicinische Untersuchung des Menschlichen Urins. Stuttgardt. 1835.

prove this fact, it appears to be doubtful whether this acid be not a product of the process, and not a constituent of the urine in its normal state. The Spanish chemist Proust * was one of the first to point out the presence of this acid in the urine, which he denominated the acetic acid; but the process was such as would have produced a similar result with many other mixed animal fluids in which no acetic acid existed previous to undergoing the chemical manipulations. It is not meant to be stated that the lactic or acetic acid does not exist as a natural constituent of the urine; but we wish it to be understood, that the process hitherto employed to demonstrate the presence of this acid in a free state, has not appeared satisfactorily to prove its existence as a natural constituent of that fluid.

The colouring matter of the urine, in itself of considerable importance, and to which the peculiar odour is said to be owing, the author thinks, has been too much overlooked. The disposition of urine to undergo spontaneous decomposition seems to depend much on the greater or lesser quantity of this substance, and, as mentioned above, it seems to perform an important part in holding the lithic acid in solution. Mucus he considers as an accidental addition to healthy urine, derived from the mucous surfaces over which the urine passes.

The salts with inorganic acids and bases he also considers as accidental, though they are regular constituents of the urine, the elements of them all being introduced with the food; ammonia alone being probably a product of the chemistry of the system, or of the kidney in particular. Dr Willis believes carbonic acid to be a very constant element in urine; a fact which appears to be well established by the previous researches of Dr Sylvius Proust, though Berzelius in his elaborate analysis of the urine makes no mention of this acid. The author thinks this acid is chiefly concerned in holding the phosphatic salts in solution. Silica is regarded as an accidental ingredient, introduced with the water used as drink.

Dr Willis describes next the disorders in the urinary secretion, which, with much propriety, he classes under two heads;—1. " Functional derangements of the kidneys, and their immediate consequences;" and 2. " Functional derangements of the organs which secrete the urine." The first of these being the most important, the greater portion of the volume is devoted to their consideration.

The first chapter treats of the "morbid states in which the secreting faculty of the kidney is exalted, and the menstruum and readily soluble principles of healthy urine occur in altered, absolute, or relative quantity." This again is divided into three sections, according as there occurs a general deficiency of solid mat-

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* Annales de Chimie, Tom. xxxvi. Traduit de l'Espagnol de 1799 en 1801.

ter,—a deficiency of urea,—or a superabundance of urea; and these are characterized severally by the names of *Hydruria*, *Anazoturia*, and *Azoturia*.

The first of these, *Hydruria*, can scarcely be called a disease, as it does not seem to have materially affected the health of the individuals in whom it occurred, several cases being mentioned where this complaint continued during life. The copious discharge of limpid watery urine on the conclusion of the hysterical paroxysm, Dr Willis classes under this head. Anodynes and tonics, with some mild aperient, and remedies which promote the action of the skin, the author considers to be the proper treatment. One case is related where, under the use of a blister applied to the chest for another complaint, and kept suppurating for twenty-five days, the disorder was found to be removed.

Anazoturia, or the copious discharge of urine, characterized by both a relative and absolute deficiency of urea, is by no means a rare disease. The urine is limpid, of a pale straw-colour, or colourless, with a very slight, faint odour. It soon decomposes, becoming faintly ammoniacal, and covered with a fine creamy pellicle of the ammoniaco-magnesian phosphate. The author has found it to be a common disease among the children of the poor, but to be by no means confined to children; and he suspects that many of the cases which have been described under the name of *diabetes*, and *diabetes insipidus*, are of this nature. This malady is attended with gnawing sensations at the pit of the stomach, white furred tongue, constipated bowels, thirst, and a parched state of the skin, emaciation, loss of strength, and depression of spirits. He regards the disease in rather an unfavourable light, as many of the apparent cures have been of only temporary duration. The treatment recommended is to restore the functions of the stomach, bowels, and skin; to allay the habitual excitement under which the kidney labours; and to confirm the general strength. This is to be effected by aperients, tonics, and anodynes, with light nourishing and solid food, avoiding the use of liquids.

Azoturia, or urine containing a superabundance of urea, is another of the morbid states which have been described under the name of diabetes. The urine is generally great in quantity, transparent, or light-coloured, though it has been seen of a very dark hue, exhales a faint urinous odour, and reddens litmus-paper. The density is generally high, from 1.018 to 1.035; and the urine often yields crystals of the nitrate of urea on the addition of a few drops of nitric acid, even without previous concentration. The calls to make water are peculiarly urgent when they occur, and they are very frequent. Languor, emaciation, and loss of strength attend this complaint. Dr Willis considers the ureous diathesis to be intimately connected with the mellitic, and frequently to precede that dangerous disease. He does, however, not regard the disease, if taken in time, as fraught with the formidable consequences which might be apprehended. The proper function of the kidney being merely exalted, that organ is only in a state of erethism, which requires to be subdued. Bleeding generally, or locally from the loins, blistering, bitter tonics, chalybeates, and opiates, with a regulated diet and attention to the state of the bowels, the author considers adequate to control the disease, even though it has existed for a considerable time.

The author concludes this chapter by giving a short but correct account of the mode of investigating the physical and chemical properties of urine; and as the details given are sufficiently minute for medical purposes, we quote the passage.

> " The general appearance, degree of transparency, disposition to deposit, odour, &c. are next to be noted. The specific gravity is then to be ascertained, a piece of knowledge easily procured by means of an instrument,—the hydrometer, or urinometer, sold in the shops for the purpose. A given quantity of the urine, say 1000 grains, is then to be slowly evaporated, at a temperature not exceeding 160 or 200 degrees of Fahrenheit, till it ceases to lose weight. The quantity of extract being ascertained by weight, the proportion of the solid matters to the water will become exactly known. The extract is next to be digested with strong boiling alcohol, (sp. gr. .833,) which will take up the urea and salts (the lactates,) which are soluble in alcohol. What is dissolved is to be poured off; what remains is to be washed once or twice with a little fresh boiling alcohol, which is to be added to the first. The alcoholic solution is then to be reduced by slow evaporation to the consistence of extract, or till it ceases to lose weight, and its quantity ascertained. The saline mass, which was insoluble in alcohol, is to be treated with distilled water, at 60 degrees Fahrenheit, two or three times, and the different solutions being added together, and evaporated to dryness, the quantity of saline ingredients, the soluble chlorides, and alkaline phosphates and sulphates, will be discovered. The insoluble matters, consisting principally of the earthy phosphates, which remain on the filter, being dried, are to be weighed. They are afterwards to be digested with caustic potash; and being dried and weighed again, the quantity of mucus and other animal matter will be estimated by the loss of weight, if any, which is sustained."—P. 25—27.

The second chapter is devoted to the consideration of the "morbid states in which the secreting faculty of the kidney is lessened or abolished;" *Anuria* of the author. This is the symptom commonly known by the name of *Ischuria renalis.* It occurs to a certain extent in many, perhaps most acute diseases, after severe operations, or after scarlet fever. Two forms of it may be distinguished, one with, the other without fever. Suppression of urine, but without preceding inflammatory fever, occurs amongst children, and has been described under the name of *Urodialysis neonatorum;* and a similar affection is occasionally observed in persons in the decline of life. The digestive powers are in both these instances observed to be disordered, and the functions of the skin are impaired. The urine is in very small quantity, and is highly irritating, its excretion being attended with much pain. Dr Willis thinks this disease in the aged depends "either on an erratic gouty state of the system at large, or on an arthritic inflammatory condition of the kidney in particular." He proposes for this form the name of *Anuria pyretica.*

The disease, however, commonly known as *Ischuria renalis,* the author proposes to term *Anuria* or *Anuria apyretica,* as it "does not appear to be commonly or necessarily connected with any kind of general constitutional disturbance in the first instance, but to have its beginning, and to derive all its striking characters, from lessened or suspended action of the kidney." It is a disease most common in young children and in persons advanced in life. If the urine be completely suppressed, coma supervenes on the fourth or fifth day, and in a few days more the person dies. Still many remarkable cases are related where no urine has been passed for many days or even weeks, and yet the persons have recovered. With regard to many such cases, Dr Willis remarks, "that the disease evidently depended, not on paralysis of the secreting function of the kidney, but on some impediment to the escape of the urine duly elaborated." This appears to be clearly borne out by the dissections by Morgagni,* Cheston, and Walter, who found the cause of the obstructed flow of urine to depend generally on calculi in the kidneys or in the ureters.

It has been often asserted, that when the urine is not eliminated from the system by the usual organs, a discharge, presenting all the characters of urine, has occurred from other parts of the body. But Dr Willis does "not believe that any one organ in the human body can discharge the office of any other;" and he consequently does not believe that "the axilla, umbilicus, mamma, external ears, or stomach, ever took on themselves the function of the kidney, and secreted ounces, pints, or quarts of urine." There is much good sense in the author's remarks on this subject; yet the evidence of vicarious discharges is so strong, and supported by testimony of such undoubted authority, that it appears difficult to account for the long duration of many of the cases, unless on the supposition, that urinous matter was somehow or other thrown out from the system.

That vicarious discharges do occasionally occur in the human frame can scarcely be denied; and when the menstrual flux has been suppressed, a sanguineous discharge has been at various times seen to flow from the nose, mamma, ear, eye, and from ulcers.[*] It has several times been remarked that, when abscesses existed in other organs, purulent matter has been thrown off by the kidney, and by the mucous membrane of the bowels, followed by the disappearance of the purulent collection; and cases of this have been related by Paré, Belloste, Quesnay, and others. If it be admitted that any single case is decidedly one where an organ for the time being assumes the functions of another, it may be inferred that the same thing may happen a second time, or with other organs. Besides, do not the researches of the microscope show that all glands, almost all organs, are of nearly the same structure? If so, where is the difficulty of supposing that, when the functions of one organ are destroyed, its office may be taken by another? The urinary secretion, in particular, is one which, without any great violation of the laws of nature, could be easily supposed to be assumed by any other organ, whether that organ were of a glandular nature or not. For do we not find, according to the researches of the latest physiologists and chemists, that the very peculiar substances of the urine exist ready formed in the blood? so that when we are told by Malpighi of a case where, during a suppression of urine, the saliva and halitus had a strong urinous odour and taste, and of another in which the same was observed, and where on dissection the cheeks and parotids were found tumid, and exhaled a urinous odour, and many similar cases are related by Bartholini, Zeviani, Hahnius, Vallisnieri, Morgagni, &c. we can scarcely resist the conclusion, that, occasionally at least, one organ may perform the function of another.

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* De Sedibus et Causis Morborum per Anatomen indagatis. Venetiis, 1761.

In most of the undoubted cases of vicarious discharge of urine, death has occurred after a longer or shorter period, and dissection has revealed the fact, that the disease did not depend on the want of power of the kidney to secrete urine, but that the excretion was prevented by some mechanical obstruction, as for instance calculi in the ureters. But even supposing that there were no recorded cases of vicarious discharge of urine, we think that the following circumstance, which is by no means of rare occurrence, would prove its possibility. A healthy man, for instance, is in a situation, where, however pressing be the calls of nature, it is entirely out of his power to yield to them. For a time he is in great pain and uneasiness on this account. At length a copious sweat breaks out over all his body; he feels much relieved; and after this will sit for hours, with only occasional very slight desire to make water. When he has an opportunity of emptying the bladder, he generally finds he can only pass a small quantity; and it is commonly a day or two before his urinary discharge appears in its accustomed quantity. This is not, however, what always occurs in such cases, for frequently the desire goes off, because the bladder becomes over-distended, and loses the power of contracting on its contents; but we have known several instances where what we have mentioned above has occurred, so many, indeed, as to lead to the belief that it is the most common way of nature relieving herself. Now if such a mode of relief occurs during health, how much more likely is it to happen during disease?

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[*] Two of the latest instances of this vicarious discharge are recorded by Dr Ashwell in the third volume of Guy's Hospital Reports, p. 156.

Dr Willis considers exposure to cold as the most probable cause of Anuria, though it is often difficult to refer the attack to any particular cause. He mentions one case in which it appears to have succeeded external violence, as also two cases, which he gives at length, where the symptoms were caused by renal calculi. The symptoms attending these cases, and the appearances on dissection, agree remarkably with several of those cases of ischuria related by Morgagni, where, however, from a vicarious discharge of urinous fluid having occurred from the salivary glands and skin, life was protracted much longer than in the case quoted by Dr Willis, viz. from one to six months.

The author mentions various morbid appearances of the kidney and adjacent parts as having been found on dissection; but dissection has, as yet, thrown but little light on the nature of this disease; as the same appearances have been met with in the bodies of persons who have died of other diseases, and whose urinary discharges were not suppressed. The proximate cause, however, the author remarks, appears to be paralysis of the secreting part of the kidney, and this probably comprises all we as yet know of the disease.

Copious general and local blood-letting, with large and repeated blisters on the lumbar region, the internal exhibition of cantharides, and free action of the bowels, are the means of cure recommended. If calculi or gravel in the pelves of the kidneys be suspected, copious dilution with fluids holding in solution the bicarbonate of soda or potash, the hot water, vapour, or hot air bath, and also emetics might be prescribed with a prospect of success.

In the third chapter the author considers the "morbid states in which the urine contains in excess, and as precipitates, certain ingredients that occur normally in smaller quantity and in solution." This is divided into two sections; 1*st*, in which the deposit consists of the lithic acid and lithates, and 2*d*, in which the sediment consists of the phosphatic salts.

The first of these, to which he applies the term *Lithuria*, is the most important as well as the most interesting, seeing by far the greater number of urinary calculi are found to have their nucleus composed of lithic acid. The urine from which these peculiar sediments are deposited is generally high-coloured, and of high specific gravity, varying from 1.018 to 1.022. As the fluid cools, crystals of the uric acid are deposited. He takes occasion again to notice the sparing solubility of this acid, and the probable explanation of its solution in the urine. In his account of the precipitates or sediments deposited by this sort of urine, and the correlative states of the system, Dr Willis follows the previous description of Dr Prout. Four precipitates are thrown down by this kind of urine, viz. red crystalline sediment, composed of lithic acid and colouring matter; the lateritious, red, or reddish brown sediment, composed of lithate of ammonia, purpurate of ammonia and soda, and colouring matter, or simply of lithic acid and colouring matter; the yellowish sediment, composed essentially of lithate of ammonia, or simply of lithic acid and a little colouring matter; and the pink sediment, composed of lithate and purpurate of ammonia. These sediments are frequently observed on the termination of fevers, and are often critical. This fact was well known in the days of Hippocrates and Galen, and all the older writers, who describe the appearances and differences of these precipitates with remarkable minuteness and precision.

This state of the urine, however, exists independently of any febrile affection, and the author follows Dr Prout in representing it to be of most frequent occurrence in infants, and in persons between forty and sixty years of age. The chief cause of the formation of lithic acid is indulgence in large quantities of animal and other highly nutritious food; and the separation of the lithic acid appears to be much dependent on the presence of free acid, whether this be engendered in the system or introduced from without. The author's mode of accounting for infants and persons between the ages of 40 and 60 being most subject to this complaint, appears to be quite satisfactory; but he cannot make up his mind to believe that dyspepsia or bad digestion is the most efficient cause of a lithic state of the urine, as has been so generally maintained, since he has "not found the urine of those who were habitual sufferers from dyspepsia, save on very rare and distant occasions, to deserve the epithet of lithic." The stomach, indeed, becomes affected, but it is secondarily, and in consequence of the general disturbance of the system. He notices the fact of the cyder counties in England, and the Prussian provinces on the Rhine, being remarkably free from calculous complaints, though the drink in both contains a considerable quantity of acid, in combination generally with potash; but he accounts for the fact by supposing that these salts undergo more or less complete decomposition in the stomach; and that the acid probably escapes by the skin, whilst the alkali passes by the kidney, and is voided with the urine. He regards the cyder and sour wines of the continent as essentially different from the malt liquors so commonly used in England; the former being little better than vinegar in disguise, and a powerful cause of the deposition of lithic acid from the urine. He mentions the close connection between the gouty and gravellish constitutions; and that in many cases they may both be traced to the over-indulgence of the animal appetites, hunger and thirst. He remarks that sudden chills are a common cause of renal complaints, and of the deposition of the lithic acid and lithates, and thus accounts for the greater prevalence of gravellish complaints in some counties of England than in others, where the habits of the people are the same.

The treatment recommended to be pursued in the lithic diathesis consists in reducing the tone of the system by blood-letting and purgatives, low diet, the plentiful use of diluents, and the common effervescing draught three or four times daily. By these means, the tension of the system is reduced, and the urine, from being deeply coloured, strongly acid, and highly charged with lithic acid, becomes copious, pale, and neutral, or slightly alkaline. He thinks that the quantity of crystallized lithic acid which these remedies usually bring away, may, in some cases, be regarded as a critical discharge, in others, merely as the effect of the mechanical and chemical action of the diluents. Following the example of Dr Henry and Dr Prout, he recommends one or two doses of turpentine in cases where uneasiness is still felt in the region of the kidney, these having often the effect of bringing away a quantity of sabulous matter; but he condemns the addition of muriatic acid and opium to the terebinthinate diuretic, "as it is just possible they might lay the foundation of a renal calculus." If the morbid state of the kidney should be traced to local injury or severe fatigue, bleeding from the loins by leeches or cupping, and the insertion of a seton, would be proper. Mercurial alteratives and mild aperients, continued for a length of time, are always useful in this state of the system. But the specific plan of treatment consists in the exhibition of the alkaline bicarbonates in a state of large dilution. From half to a whole drachm of the bicarbonate of potash or soda, dissolved in from three-quarters to a whole pint of any mucilaginous fluid, should be taken two or three times a day, according to circumstances, at periods as remote as possible from those at which meals are taken. Much advantage is derived from the patient leaving his ordinary place of residence or business, and spending a few months at one of those watering-places where the springs hold in solution a considerable quantity of alkali. The author mentions the waters of Vichy, Mont d'Or, Carlsbad, Seltzers, Pyrmont, and Obersalzbrunn, as having the same effect in different degrees; the first being by far the most powerful, an ordinary tumblerful holding in solution nearly eighteen grains of the bicarbonate of soda. He considers the same beneficial results would follow from taking the solution of an alkali in carbonic acid water, at home, provided it could be conjoined with country air, healthful exercise, and relaxation of the mind. He concludes this section with some excellent remarks on the mode of conducting the chemical examination of lithic urine, and its deposits.

The second section of this chapter treats of the "sedimentary urine, in which the deposit consists of the earthy and alkaline phosphates," and which the author terms *Ceramuria*. He remarks that these substances are generally held in solution by a free acid in the urine, and that this acid is the carbonic. The deposit of the lithic acid is not incompatible with a ruddy complexion and other marks of high health; but the phosphatic diathesis, even in the milder forms, is never seen amongst individuals who are robust or ruddy, but is constantly attended by a great degree of nervous irritability, general delicacy of health, and with much disturbance of the digestive functions. When the phosphatic sediment first occurs it is observed to alternate with the cream-coloured or tawny sediment of lithic acid; but as the phosphatic diathesis becomes more confirmed, the lithic deposits become more and more rare.

This state of the system is usually attended with more or less uneasiness in the lumbar region. The urine is pale and in large quantity, and when the disorder is confirmed, it is alkaline, and passes rapidly to putrefaction. Crystals of the phosphate are rarely deposited within the body, and then only in cases of long standing, where the kidneys and bladder are deeply implicated, and the urine is ammoniacal when passed. The author regards a phosphatic state of the urine not as an original idiopathic malady, but as the sequence and complement of some serious general constitutional disorder, or of a state of great irritation, often of structural disease, of one or other of the urinary organs. He cautions against mistaking for albumen, the flocculent precipitate which occurs from the action of a boiling temperature, and he recommends always to add a few drops of nitric or muriatic acid, when the precipitate is dissolved, showing it to have consisted merely of a phosphatic salt.

In considering the treatment, the author recommends particular attention to be paid to improving the constitution, and allaying the irritable state of the urinary organs; and lays down some very valuable rules with regard to diet and regimen. He recommends great attention to be paid to the free evacuation of the bowels, and for this purpose, he gives the preference to rhubarb, aloes, senna, or castor oil; saline medicines and mercury he condemns. He recommends opium as the most invaluable of remedies, and prefers the crude state or watery extract to all its other preparations. When the excessive irritability is destroyed, he urges the employment of tonics, as bark, calumbo, iron, &c., and whenever it is practicable, removal to the country.

The fourth chapter treats of those "morbid states in which the urine contains in solution, or, as precipitates, certain principles which do not occur in the healthy secretion, but appear to be derived immediately from one or other of these." These are considered in twelve sections.

1. *Lithoxiduria*, or the discharge of urine containing the lithic or Xanthic oxide. This substance has only been recognized in renal calculi, and appears to consist of the same elementary constitution as the lithic acid, minus one atom of oxygen.

2. *Cystinuria*, or cystic oxide state of urine, has been several times met with. In all the recorded cases, the urine had an oily appearance, and a peculiar odour. Acetic, citric, or tartaric acids throw it down from its combinations with alkalies, and are the best tests for its detection.

3. *Porphuria*, or discharge of urine which contains purpuric acid and its salts, is by no means of rare occurrence. It has been doubted whether the pink colour of the sediment was owing to purpuric acid, or depended on some peculiar colouring matter in the urine; and it would appear from the varied researches of different chemists, that in some cases, the colour was owing to purpuric acid or its salts, in others, to a peculiar colouring matter in combination with lithic acid. The pink sediment occurs on the termination of various fevers, and in a less marked degree appears to be almost habitual to certain individuals of excitable and delicate constitution; it has been affirmed that the purest specimens have been seen in dropsical cases, and in those labouring under chronic affections of the liver. Closely connected as this disease appears to be with the lithic state of the urine, or identical with it, as has been above stated, the treatment is to be regulated on much the same principles as in that form. The author mentions that he has been induced to treat these pink and rose-coloured sediments under a separate head, in deference to Dr Prout, though he believes that they will be found to constitute, after all, only a variety of those states of the urine where that fluid is found to occur of a brown, green, blue, or black colour.

4. *Oxaluria*, or urine containing a salt of oxalic acid, is perhaps of more common occurrence than has been generally imagined. The oxalic acid is one of those which enter the general circulation, and are thrown off by the kidney unchanged. It is found in several of our articles of diet, as in the stalks of rhubarb, sorrel, and tomata; and concretions of the oxalate of lime have actually been found in the pelvis of the kidney in persons who used sorrel as a regular article of diet. It has been always met with in combination with lime. The author advises the same treatment as that required for the lithic acid diathesis.

5. *Albuminous Urine.*—Dr Willis considers that there are two distinct forms of albuminous urine; one in which the albumen appears to be formed at the expense of the urea, inasmuch as in proportion to the quantity of the albumen is the deficiency of

urea; and the other in which, the urea remaining of its original quantity, the albumen appears to be derived from the serum of the blood escaping through the relaxed tissue of the kidney, *sero-albuminous urine.* The first of these, being almost always dependent on disease of the kidney, is fraught with great danger to life; the last does not necessarily interfere with the prospect of longevity. In the first the urine is of low density; in the last the specific gravity remains as during health, or nearly so. He considers that the albuminous state of the urine which occurs in the anasarca following scarlet fever, or in the course of other acute diseases, and that said to be habitual to the natives of the Isle of France, belongs to the last of these forms; and this opinion derives some confirmation from the researches of Dr Graves, Dr Mateer of Belfast, Dr Elliotson, and M. Martin-Solon. Dr Willis sums up his opinion in the following words: "All we know would, therefore, lead us to infer, that, in the dangerous form of albuminous urine, either the formation of urea, wherever this takes place, was suspended, that it was not duly separated from the blood by the kidney, or that, in the process of elimination, it had a large accession of carbon and of the elements of water, and so became albumen, just as albumen, the epitome and resulting principle of all the heterogeneous matters taken into the body by animals as food, must lose a large quantity of carbon and of the elements of water, in order to be converted into urea and uric acid, the representatives of the effete elements of nutrition in animals from the highest to the lowest. We know that urea is not formed by the kidney, but only abstracted from the blood by its agency; and the presence of urea in the dropsical fluids of those who have been passing albuminous urine, indicates that this substance is produced in the body as usual. The conclusion would therefore be, that the urea was imperfectly and but partially withdrawn from the system in these cases, the elements of that which was abstracted appearing in the shape of albumen. May a defect in the decarbonizing process of the economy have anything to do with the etiology of dropsies with albuminous urine? In the other form of albuminous urine, we can only conclude that the albumen of the blood finds its way into the urine, probably accidentally, by the ready strainer of the kidney."—P. 123.

The above passage seems to contain the full amount of our information, and to furnish a clearer exposition of the phenomena than any yet attempted. It agrees with all the recorded observations, and reconciles the conflicting opinions of authors with regard to the inference to be drawn from the presence of albuminous matter in the urine. Thus some have affirmed that the presence of albumen in the urine is a never-failing indication of organic disease of the kidney, whilst others have regarded it as merely indicative of a febrile state of the system, or of some general or local inflammation, or of functional derangement of the kidney, or merely as the effect of a general effusion of serous fluid into all the cavities of the body.

6. Carbonate of ammonia has been several times observed in the urine of patients labouring under severe attacks of fever, and in circumstances which preclude the possibility of its having been formed from the decomposition of the urine in the bladder. In the cases where the urine was particularly examined, the urea was found to be deficient in quantity, and where the carbonate of ammonia was in large quantity, the urea was entirely gone. The author regards ammoniacal urine as "plainly a consequence of other primary and deranged conditions of the system in general, or of the chylopoietic organs in particular," and the treatment must be regulated accordingly.

7. Dr Willis notices the occurrence of hydrocyanic and ferrocyanic acids in the urine of patients who have been taking preparations of iron, and in these attention was drawn to the urine from the circumstance of the discharge being of a blue colour. The author quotes one case where the prussic acid was passed with the urine uncombined. This peculiar state of the urine does not appear to have been attended with any particular consequences.

8. The author considers it possible that carbonate of lime may occur in the urine, as small renal calculi have been detected composed entirely of this substance.

9. Luminous or phosphorescent urine, *phosphoruria*, has been but rarely observed, and Dr Willis notices the recorded cases. It appears a curious circumstance, that almost all these cases of luminous urine occurred after liberal potations; and Dr Willis has suggested the following questions, which, it were to be desired, were strictly investigated: "In what state is the urine among habitual drunkards, among those corpulent dram-drinkers, who might be held good subjects for the occurrence of that strange phenomenon, spontaneous combustion? The breath, and even the whole person of those individuals, often smells very decidedly of phosphorus. Is it possible that the phosphorus which is commonly eliminated in such quantity by the kidney in combination with oxygen as phosphoric acid, is not duly discharged? that the body becomes as it were a sponge filled with an oily solution of phosphorus, in which combustion once begun may go on at a temperature not high enough in every instance to char, or at all events to ignite, vegetable substances, just as we see a stick of phosphorus slowly consumed by proper combustion, when it is exposed to the air, yet without setting fire to the paper, &c. in which it may chance to be wrapped?" —P. 137.

10. The discharge of urine of various abnormal and remarkable colours has been observed from the earliest ages, and black, blue,

green, red, and white urine are mentioned by almost all the old writers. Recent researches have shown these colours to depend on various causes; in some cases on the presence of a salt of iron, in others on a purpuric salt, in others again on some peculiar colouring matter. Of these Dr Willis mentions several; but it would appear that our knowledge of these states is too imperfect to authorize any conclusions to be drawn from them.

11. Urine of various peculiar and abnormal odours has been frequently observed; but our information on this subject is very imperfect. Many curious observations, however, relative to this may be found in the older writers, who appear to have paid much more attention to this subject than modern observers. Dr Willis does little more than mention the subject.

12. The presence of silica in the urine the author regards as accidental, being probably introduced with the articles of food or drink.

The fifth chapter treats of those "morbid states in which certain matters being constituents of the blood are contained in the urine." This chapter is divided into three sections, according as the urine contains albuminous, oleo-albuminous, or bloody matters mixed with it.

With regard to the first of these, we have already stated the author's opinion when we noticed the subject of albuminous urine.

Oleo-albuminous urine has been pretty frequently noticed. The urine is generally of a more or less milky or opaque hue; and on analysis has been found to owe its peculiarities to oily and albuminous particles. The matter has been described as casein by some authors. The author considers urine which on cooling becomes a trembling jelly to be only a modification of this state; the albumen in this case presenting the fibrinous modification. He mentions several instances of this singular variety of urine, and observes that the derangement certainly occurs without any great amount of constitutional disease, often without the slightest implication of the general health. It has been asserted that oleo-albuminous urine is endemial in certain countries, as in Brazil.* If so, the subject certainly deserves further investigation.

The discharge of urine having all the elements of blood mixed with it, *Hæmaturia*, is a much more serious disorder. It is almost always observed as a sign and sequence of some disease of the urinary passages, of a calculous concretion, or of local injury. Oleo-albuminous states often alternate with proper bloody urine, and the author separates these two varieties more from custom and authority than from the suggestions of his own mind. He mentions a curious fact, and one which is not generally known, that a kind of endemic hæmaturia prevails in the Isle of France, without its appearing to prejudice the health of the children amongst whom chiefly it occurs. He describes a variety of this complaint, where the urine on being passed becomes a solid tremulous mass, in look like red-currant jelly; but he thinks the term hæmaturia ought to be restricted to those cases where "there was simple exudation of blood from some point of the mucous surfaces lining the urinary passages, or direct extravasation from the vessels of the kidney." In such cases the fluid discharged is less albumino-urinous than a mixture of blood and urine. This appears to be a good distinction, and one which is easily recognized in practice; the colouring matter of the blood and the fibrin being generally deposited in the shape of a dark-brown sediment.

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* L'Experience, No. xlii.

Dr Willis disapproves of general blood-letting in this affection; but recommends local bleeding from the loins, by cupping or leeching. The antiphlogistic regimen, a mercurial purge, and occasional saline laxatives, and cold enemata, may be all which are required. When there is much pain and irritation, he recommends opiates and the warm bath. He also recommends great caution in the use of the catheter if the blood should coagulate within the bladder, and thinks it safer to suck it out by means of a syringe, or to wash down the clot by the injection of warm water.

The sixth chapter is devoted to the consideration of the "morbid states in which the constituents of secretions and altered elements of the blood are discharged with the urine." These are scales of the epithelium or cuticle of the urethral mucous membrane, pus, mucus, prostatic and spermatic fluids, bile, milk and yeast. It seems sufficient to notice these by name, the appropriate tests making known their nature. The microscope is here of great value, most of the substances being capable of detection by its aid alone.

In the seventh chapter the author considers the morbid states in which principles foreign to the urine and the blood, and derived from none of the natural constituents of these fluids, are eliminated by the kidney." *Diabetes mellitus* or *Melituria* is the only disease under this chapter. The author, however, thinks that we shall one day be "able to connect the causes of disease in many other instances with the generation in the system and presence in the circulating fluids of certain peculiar forms of matter." He alludes to the "animal poisons or contagions properly so called."

Melituria is distinguished from all other urinary complaints by the sweetness of the urine. Dr Thomas Willis[*] is commonly supposed to have been the first who observed this saccharine state of the urine, and is quoted as such by the author; but we find that Vassæus,[*] in his treatise on the urine, mentions the fact in such a way as to make it appear he was aware of its occurrence; and he also notices another circumstance which was for the first time again brought under the notice of the public by Dr Rollo,[†] viz. that the blood does not undergo spontaneous decomposition when this state of the urine occurs. The words of Vassæus are, " sanguinis non putrefacti dominium, nempe sanguis suapte natura calidus et humidus, et dulcis existit." This treatise is written in a curious quaint style, and no one will quarrel with it on account of its prolixity.

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[*] Opera Omnia Thomæ Willis, M. D. Art. de Urinis. Amsterdam, 1683.

No doubt exists now as to the urea in this disease being in as great abundance as it is during health, and in some cases, which have been carefully examined, the quantity passed daily has more than doubled the quantity discharged during health. A very full history of the disease is given by the author, who considers no peculiar cause for this disease as having been well ascertained, excepting inherited predisposition. It attacks the temperate as well as the dissipated. Something he is inclined to attribute to exposure to cold; but it does not appear that this is by any means proved. Dr Willis enters at some length into the various hypotheses which have been adduced with regard to the seat of the disease. He mentions that of Rollo, who fixed its seat in the stomach; that of Frank, who ascribed it to a particular virus or poison; the chemical theories of Dr Lubbock, and of Haase, and that of Dezeimeris, who regards it as depending on gastritis. The late researches of Mr M'Gregor of Glasgow [‡] appear to go far to prove the sagacity of Dr Rollo's original assertion, that the stomach is the organ primarily and chiefly at fault, and though his words may be interpreted differently, the whole train of his remarks tend to show that such was his idea. Dr Rollo attempted to prove that the food was converted into sugar in the stomach,—a point established by Mr M'Gregor. Dr Rollo also maintained, but did not prove, that saccharine matter existed in the blood, and this fact, too, is confirmed by Mr M'Gregor and Dr Rees.[§] Saccharine matter has also been detected in the furfuraceous scales of the cuticle, in the saliva, and in the feculent discharges, all showing that the sugar is not formed in the kidney, and consequently that this organ is not alone at fault. The conclusion at which Dr Willis arrives is much the same as that originally promulgated by Dr Rollo, though stated in other words. " Derangement of the digestive functions (says he) is here unquestionably the head and front of the offence;" and again " the derangement of the kidney is purely secondary."

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[*] De Judiciis Urinarum Tractatus, &c. Joanne Vassæo Meldensi autore, Venetiis, 1549.

[†] An Account of two Cases of the Diabetes Mellitus, with Remarks. London, 1797.

[‡] Med. Gazette, Vol. xx. *passim*. [§] Guy's Hospital Reports, Vol. iii. p. 398.

It is satisfactory to see the doctrines of Dr Rollo thus far confirmed; for, notwithstanding the various hypotheses regarding Diabetes mellitus, which have from time to time been published, we have always looked on Dr Rollo's explanation as far more consonant to observed facts than any other; and when this explanation is so well supported by the researches of Mr M'Gregor, it is to be hoped that the wavering method of treatment which the former conflicting hypotheses were too much calculated to produce, will be at an end, and that persons labouring under this disease will be no longer regarded as merely fit subjects for experiment. It may be remarked, that pathological anatomy has not thrown much light on this singular affection, though all it has shown has certainly rather tended to strengthen the opinion as to the gastric nature of the malady.

Dr Willis's opinion with regard to the disease being functional, induces him very properly to look upon it in a far less formidable light than it has hitherto been the custom to do; and he very justly remarks, that "all we know leads us to infer that for functional disease a remedy exists;" and the plan of treatment he recommends seems well calculated to attain the object in view. He advises to correct, as far as possible, whatever is faulty amongst the functions at large, or in any one in particular; general blood-letting, with the application of leeches or cupping to the regions of the stomach and kidneys; opium in doses to procure its tranquillizing effect, and no further; ipecacuanha or tartar emetic to aid the opium in determining to the skin; frequent emetics; and purgatives given so as to produce one or two semifluid evacuations every day. He particularly recommends the hot air-bath or *sudatorium* as one of the most powerful means of exciting the action of the skin; and calls particular attention to the fact that, in Russia, where all classes use it, this disease is quite unknown. He likewise notices the particular or specific medicines, if they might be so called, which have from time to time been employed; but the only one in which he is inclined to put the slightest confidence is magnesia. He recommends in all cases, after the excitement of the stomach is somewhat abated, the employment of the bitter tonics and mild chalybeates. He also approves of the employment of counter-irritation to the region of the stomach. His remarks on the proper diet for diabetic patients are particularly worthy of notice. He also would confine his patients chiefly to animal food; but, as nourishment in too concentrated a form is hurtful to man, he would give with it a proportion of woody fibre, or other indigestible substance, as bran or the woody fibre of the potato, or any other substance not convertible into sugar. He hints at giving the food by means of an œsophagus tube, to prevent its being mixed with the saliva, as it has been shown that it is by the agency of the saliva that the starchy and gummy parts of vegetables are converted into sugar. He concludes this chapter with some directions for the analysis of diabetic urine.

The eighth chapter is devoted to the consideration of "the formation and growth of urinary calculi," *Urolithiasis;* and this is subdivided into two sections, according as the calculi are renal or vesical.

He remarks that, when depositions take place from the urine within the body, they invariably occur in the body and pelvis of the kidney, excepting only in those cases in which foreign substances are introduced into the bladder, and that the natural nuclei of every kind of urinary calculi are engendered in the kidney. He also notices the fact, that, in aggravated cases of the lithic acid diathesis, crystalline particles of the lithic acid or of its salts may frequently be pressed out of the tubuli of the kidney, and that aggregations of these are occasionally observed clogging up the tubuli; so that it is not even in the pelvis, but in the substance of the kidney itself, that the first step in the formation of stone is achieved. He also thinks it probable that the process of generation of the other kind of urinary calculi is not essentially different. He then describes the symptoms of a fit of the gravel, together with the premonitory symptoms, as the urine ceasing to deposit a sediment on cooling, as it used to do, the feverishness, diminished urinary secretion, &c.

With regard to the treatment during a fit of renal calculus, he remarks, "that it is imperative to have an eye to the circumstances that have preceded the attack, and to make sure of the conditions and qualities of the urine that are associated with it." He then enters minutely into the treatment requisite in the different diatheses, commencing with the lithic acid diathesis; but as we have noticed this subject pretty fully when speaking of the urine with sedimentary deposit of that acid, it appears unnecessary to repeat what is there stated. When speaking of that important indication to which the treatment must be directed, viz. to attempt the expulsion and disintegration or solution of the gravel, or concretions of lithic acid, already formed, he mentions one or two cases which appear undoubted cases of solution of the calculus in the alkaline diluent, which was abundantly used during the treatment. The cases are important, and well worthy of being recorded, as showing the solvent power of alkaline remedies over this particular form of calculus.

Dr Willis notices in series the various kinds of renal concretions, and remarks that the treatment required for each is, in general, the same during the fit as for that of the lithic acid,—diluents, too, being given, not with the view, however, of dissolving the calculi, but to wash them out and prevent them from lodging in any part of the urinary passages.

Dr Willis entertains a very favourable, but well grounded opinion regarding the easy curability of vesical calculi when still in the condition of nuclei, *i. e.* just after they have passed from the kidney into the bladder. "In the state of nucleus," he says, "I believe calculus of the bladder to be certainly within the reach of medicine or of artifice; nuclei by proper management can be flooded out, dissolved, or extracted through the urethra." He therefore calls the attention of medical men particularly to this circumstance, strongly recommending the continuance of the use of proper remedies till the concretion is dislodged from the body; and never to be satisfied with that deceptive calm which almost constantly follows the escape of the calculus from the ureter into the bladder. He describes the various mechanical modes of relief which should be tried to remove the calculus, if it does not come away by the usual medical treatment. He thinks that much good would result from the physician and surgeon co-operating, and putting more faith in the medical treatment than is commonly done at this important stage of the disease.

The author then details at length the symptoms of vesical calculus, and notices a few of the other disorders which simulate that of stone. The medical treatment of stone in the bladder is considered at great length; and the author enters into a very full detail of the solvent powers of fluids, but especially of mineral waters. That which has attained the greatest celebrity with regard to its solvent action is that of Vichy in the centre of France, and the opinion entertained of it by the author is very high. He details its properties at some length, and also many of the experiments by which its solvent powers were proved. This water, it may be recollected, is a pretty strong solution of carbonate of soda in water highly charged with carbonic acid; and the conclusions to which he arrives are, that "such a water will attack something like nineteen-twentieths of all the known varieties of urinary calculi." He also remarks, that "the destruction of calculi by this water is found to be not merely, nor, perhaps, principally, by way of solution; it is accomplished in a very considerable degree, especially as regards those of the triple phosphates, by a kind of disintegration of their component particles. When calculi consist of the oxalate or phosphate of lime, mingled with lithic acid, lithate of ammonia, or the triple phosphate, this water attacks and disintegrates them rapidly, so that the sphere of its activity is still further extended."

Dr Willis is of opinion that the action of this water on calculi in the bladder does not seem to be very different from what it is when they are out of the body; and he relates a few cases in proof of his assertion. The cures which these waters have effected are certainly astonishing, and it is to be hoped that the strong representations of Dr Willis in their favour will have the effect of inducing the profession to give their patients a fair trial, either of them or their substitutes prepared at home, before they subject them to the pain and danger of one of the most formidable operations which the human body can undergo.

The author's remarks on the employment of alkalies deserve careful perusal for the purpose of application in practice. He recommends them to be given in the state of bicarbonate dissolved in water, surcharged with carbonic acid, and in a large state of solution, experience having proved them to be much more efficacious both in their solution and disintegration of urinary calculi when given in this form, than when more concentrated, or even in a caustic state; besides the additional advantage that they may be continued for any length of time without deranging the functions of the stomach and bowels. In every case it is necessary for their success that they be given in a state of copious dilution. Several cases are narrated, showing the complete success of such a practice, some calculi disappearing altogether, others being broken up and passed in small fragments. Borate of soda or borax, the author thinks also worthy of trial, from its well known solvent effects on lithic acid calculi, and from its passing unchanged by the urine, though he is not aware of its having been used internally for the cure of calculous complaints. Borax, however, was very long ago used as a solvent for stone in the bladder. Euonymus* knew a quack who was very successful in the treatment of stone by solution; and he discovered that the substance to whose solvent power the cures were chiefly owing was borax. Still, in spite of this testimony to the solvent powers of this simple and innocuous remedy, no trials seem to have been made of it by the regular faculty; and its virtues are at present quite unknown. Lately, it is true, Wetzlar and Duvernoy have made some experiments, to show that it possesses considerable power over the disintegration of the lithic acid calculi, but beyond this nothing, so far as we know, has been done.

The author remarks, that even in those cases where alkaline remedies do not dissolve the stone, they appear to act in a manner hardly less beneficial, namely, by bringing round the system to a state in which the presence of the stone causes little or no uneasiness; so that they give the patient two chances of relief. He places little faith in the alkaline earths,—not that he considers them absolutely useless, but because "they are impotent as compared with the bicarbonate of potash or soda exhibited in abundance of water, super-saturated with carbonic acid gas." As solvents of calculi already formed, he considers acids, save in the way of injection, probably inefficient.

The observations on the solution of stone in the bladder by means of injection are worthy of careful perusal. Dr Willis shows the probability and the actual success of the process in three recorded instances, almost the only ones in which injection has ever been fairly tried. He thinks that galvanism might be used with advantage in promoting the decomposition and disintegration of calculi; but the difficulties attending its application have hitherto prevented its being tried on the human subject. It is only after a fair trial has been given to each or all of these means, and they have failed, that the author would ever recommend having recourse to the dangerous operations of lithotomy or lithotrity.

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* Thesaurus Euonymi Philiatri, de Remediis Secretis, &c. Tiguri, 1554.

We conclude our notice of this long but interesting chapter, with stating the author's conclusions in his own words, agreeing in every point with our own convictions.

> "My own most anxious wish, however, were that we should see our highest glory here as elsewhere in the bloodless surgery of the present day, in preventing the necessity of an operation of any sort. Under favourable circumstances I have myself implicit confidence in the means we possess of doing this. These have been amply detailed in the preceding part of this long but most important chapter. With due attention to every requisite, with perseverance in the use of appropriate remedies, I repeat my conviction that gravelly concretions generally, and the majority especially of the smaller sized vesical calculi may always be so much reduced in size, that they may be extracted or voided by the urethra, and thus the suffering and risk to life inseparable from a most painful, and, on the average, still fatal operation be avoided."—P. 348.

The remainder of the volume is devoted to "the functional derangements of the organs which excrete the urine." Of the impediments to the discharge of the urine, the author considers dysury, strangury, and ischury, as but three names expressive of so many degrees of a variety of morbid states, of which the most prominent feature is a difficult or obstructed discharge of the urine. His remarks are chiefly on the last of these, *Ischuria*, as being the last and highest degree of retention.

Retention of urine may arise from two principal causes; the existence of an obstruction in some point of the urinary passages, or the want of a proper expulsive power in the bladder, owing to an atony or paralysis of its muscular tissue. The author's remarks embody all the requisite information with regard to the symptoms and treatment of the disease; and it is to be hoped that our surgical brethren will avail themselves of Dr Willis's experience on this subject, as this is one of the diseases which most generally comes under their notice. He is averse to the use of the catheter until all other means have failed; but when it requires to be employed, he strongly advocates the necessity of drawing off the urine as often as the person would pass it were he in health, that is, in general, four or five times a day. When the catheter cannot be passed, he prefers to puncture the bladder above the pubes. In speaking of hysterical ischuria, he gives one advice, which it is well to keep constantly in mind, never to consent to use the catheter if you wish to be master of your time, or wish the speedy recovery of your patient.

Inability to retain the urine, *Eneuresis*, is a characteristic and accompaniment of more than one morbid state of the bladder or urinary apparatus at large. Several varieties are enumerated, and the incontinence common in young persons is examined at considerable length. If the cause of the incontinence of urine arise from functional or organic derangement of the nerves distributed to the bladder singly, or to the bladder in common with the lower limbs, Dr Willis strongly recommends powerful counter-irritation, as the cautery or moxa applied on each side of the spinous process of the lower lumbar vertebræ. Cantharides internally, with tonics, as bark and steel, cold douche to the sacral, perineal, and pubic regions, and attention to diet, clothing, and exercise, form the means of cure. The other varieties must be treated according to their causes, whether these arise from the hysterical temperament, from spasm, from laborious labours, &c. He is justly offended at the harsh measures usually resorted to with children who are afflicted with this complaint; and he gives a few useful directions for its proper treatment; but remarks that occasionally all our remedies fail. These means consist chiefly of tonics, as concentrated decoction of uva-ursi, tincture of the muriate of iron, bitter infusion acidulated with muriatic acid and a small proportion of the tincture of opium, cold bathing to the perinæum and pubes, or a blister to the lumbar or sacral regions. He has no faith in Sir C. Bell's method of cure, *position;* but he thinks cantharides worthy of attention. He is very averse to the employment of a *jugum* in this disease; but he recommends a much more safe apparatus, viz. a firm but not hard pad pressing by means of a spring on the urethra in the perinæum.

Irritability of the bladder, *Cysterethismus*, the author considers as unquestionably connected with divers causes in different cases. It may exist as a symptom of other morbid affections, as of the kidneys, or as an independent disease, brought on by the use of too highly-seasoned food, or particular medicines. The treatment, which he directs to be varied according to the cause of each particular case, generally consists in abstracting blood locally, soothing applications, anodyne injections, and bland diluent drinks.

Two varieties of spasm of the bladder, *Cystospasmus*, are admitted by the author,—the one, where the spasmodic contraction is chiefly confined to the detrusor fibres of the bladder, causing the urine to be suddenly expelled, and attended with considerable pain; the other, and more common affection, where the sphincters of the bladder are chiefly affected, and where of course the urine is retained. This last is the more painful affection of the two, the pain in the hypogastric region shooting down into the perinæum, and along the urethra and glans, and sometimes attaining such severity as to make the sufferer cry out with agony; as the urine continues to be secreted, it adds much to the severity of the symptoms by its retention. In some cases the author believes the symptoms become blended with those of anuria, when the sinking of the powers of life, the hiccup, and the dull abstracted look of the patient, proclaim him to be in extreme danger. A fit may continue so long as fairly to wear out the patient, or a succession of fits at brief intervals may have the same effect. If the disease recurs frequently, he considers it liable to end in atony of the bladder. He attributes this affection to various causes, as to phlegmonous inflammation of the bladder, to inflammation of the urethra, to stimulating food or medicines, or to affections of other organs, as the kidneys, bowels, or rectum. The treatment recommended is nearly the same as for that of irritable bladder, and he strongly dissuades from the employment of instruments of any kind, as they are one of the most fertile sources of many of the urinary annoyances. When the disease is connected with inflammation of the mucous membrane of the bladder, the muriated or ammonia-muriated tincture of iron he considers one of the most valuable remedies.

Catarrh of the bladder, *Cystirrhœa*, the author considers to consist essentially in deranged vascular action of the mucous lining of the bladder. It occurs as a chronic idiopathic affection in men above fifty years of age; also occasionally in a more active form in young men, in consequence of imprudent interference with urethral inflammation; it is sometimes connected with erratic gout. Dr Willis details the symptoms of the complaint, noticing particularly the peculiar tenacious character of the mucus which is secreted in such large quantities. In the inflammatory form he recommends the active employment of antiphlogistic remedies, with such local anodyne applications as will soothe the irritable parts. When the disease, however, has made its approach gradually, as in old subjects, he regards general bleeding as inadmissible, but that much benefit may result from cupping and leeching, the use of the hip-bath, or general warm-bath; gentle aperients, bland diluents, and rest are likewise indispensable. After a time he advises to have recourse to tonics and the gentle stimulant diuretics, copaiba balsam, turpentine, muriated tincture of iron, or hydrochlorate of ammonia. He also highly recommends drawing off the acrid urine, and subsequently injecting a mild warm fluid into the bladder. He thinks this is of great service in all forms of the disease.

The length to which these remarks have been extended show our opinion of Dr Willis's work. It is only to be regretted that he has not give more information with regard to the indications of disease to be drawn from the appearances of the urine. This, however shortly noticed, would have given additional value to certainly the most complete treatise on urinary diseases which has yet appeared.

Art. II.—*A Short Treatise on Typhus Fever*. By George Leith Roupell, M. D., Physician to St Bartholomew's Hospital, &c. London, 1839. Pp. 301.

Dr Roupell presents his Treatise on Typhous Fever to the public, with the view of asserting the claim of that disease to be ranked among specific fevers, and of separating it from those with which it has been long improperly confounded; showing at the same time its analogy with others, and improving the pathology of all.

We learn from his treatise that the particular kind of fever, to which he applies the epithet *typhus*, had prevailed to a considerable extent in London for the last two years, and it is to this disease that he confines his observations. Fever has raged as an epidemic for several years past, both in Edinburgh and in Glasgow, and from the recorded observations on this fever in these two cities, there cannot exist a doubt as to the similarity of the disease to that described by Dr Roupell as having prevailed in London at the same time.

To prevent, so far as possible, any ambiguity as to the nature of the disease he describes, Dr Roupell first endeavours to assign to it its proper nosological position. He does not consider that any writer has yet stated this correctly, as by most it has been arranged under the head of continued fever, and placed side by side with synochus. His own opinion is stated in the following words:

> "Now the result of observation has been forcibly to impress upon me the conviction that the prevailing fever, is owing to a certain specific cause. For when closely observed it has been found to pursue a definite course, passing through its stages with regularity, spreading by infection, and being marked in its progress by a distinctive rash. Here then we have all the characteristics of the genuine Exanthemata of authors, to which class it seems correctly and exclusively to belong. It has indeed for many years been so considered by me, and this view was submitted to the public in a paper read before the College of Physicians in 1831, and has been daily

impressed upon my pupils on all occasions of clinical instruction."—P. 6.

He mentions, however, that he afterwards discovered that Professor Hildenbrand of Vienna had previously arrived at the same conclusions; and he quotes largely from that author's description of the symptoms and progress of the disease, as a standard of reference by which to compare the London epidemic. He notices several of the epidemics with eruptive rash, whose histories have been recorded, in order to prove their identity with the typhus he describes; and then he proceeds to unfold at length his own views of the disease.

He remarks that typhus, in common with all other fevers, exhibits, in the first place, all the phenomena incident to symptomatic or secondary fever; but that it has other symptoms peculiarly its own; and that these are " rash upon the skin, the power of spreading by infection, and the certain period of duration."

The rash or eruption, then, first engages his attention; and to show that this eruption ought to be regarded in the light of an exanthematous efflorescence, he gives Rayer's definition of the Exanthemata, and then proceeds to prove that the eruption in typhus possesses all the characteristics peculiar to eruptive fevers. The following is his description of the rash:

> " The eruption itself is of a red colour, the shades of which are various, in some cases bright and vivid, more generally, however, dusky, and undertoned: if the rash is fully developed, the cuticle is slightly elevated, and when the vessels are very turgid, the eruption is perceptible to the touch. It is most commonly found on the chest, trunk and limbs; sometimes on the face, and was noticed in a recent case to have reached and occupied the scalp; nor is it confined to the outer surface of the body, but extends itself to the lips and lining membrane of the mouth.
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> " It appears in spots or patches circular in form, and varying in size from the diameter of a pin's head to that of a pea. No itching attends its presence on the skin, nor is desquamation of the cuticle an ordinary consequence."—Pp. 35–36.

Eight cases which occurred to the author are given in detail to show that the rash does *not* appear at stated periods of the disease; having been noticed so early as the third, and so late as the sixth day. The disappearance of the rash likewise appears to have been equally irregular, observing no fixed periods; and in the eighth case narrated, the rash had not entirely disappeared a month after the first attack. In the seventh case, no rash whatever came out.

It is usual with those who wish to establish a fact to bring together all the circumstances which seem to bear upon it, in order that the evidence may be conclusive, and lead to the inferences which are wished to be drawn. Dr Roupell has, however, neglected to do this, as we get only a portion of the reasonings here, and another portion in a different part of his treatise, strangely mixed with other topics, with which, in many cases, they have little connection. In order, however, to allow of a fair comparison between the old theory and the new, if that may be called new which is upwards of twenty years old, we shall first state the chief arguments for the exanthematous nature of typhus, and then those which seem to be against such a supposition.

The strongest arguments in favour of the exanthematous nature of typhus arise from the presence of a rash, and from the power which this disease possesses of spreading by contagion or infection.

The *rash* in typhus is almost constantly observed; and if a case now and then occur in which it is not so, it is no more than what frequently occurs with regard to measles, but more particularly with regard to scarlet fever. The rash varies slightly we find, in the period of its appearance, but, on the whole, very generally makes its appearance between the third and sixth day of the disease. But this irregularity is also explained by what occurs in the eruptive fevers, as both in measles, small-pox, and scarlet fever the efflorescence occasionally appears earlier than usual, or is retarded beyond its ordinary period, from some yet unknown cause. The continuance of the rash, too, beyond its usual period of duration, is also explained by what occurs in the eruptive diseases.

In most eruptive diseases, not only is the skin the seat of increased action, but the whole of the mucous membranes are more or less affected. Now this is precisely what is observed in typhus. This accounts for the vomiting, the uneasiness in the stomach and bowels, the dry parched tongue, the bad taste in the mouth, the vitiated secretions of the bowels, and the constipation or diarrhœa which are met with; these two last opposite stages depending on the peculiar affection of the mucous membrane.

In the eruptive fevers also, more particularly in the scarlet fever and in measles, the glandular structures are very liable to become the seat of diseased actions. Inflammatory action in the internal and external ear, leading to the formation of matter, which is common in these diseases, is of frequent occurrence in typhous fever; for we frequently meet with swelled parotid or submaxillary glands, very often with glandular disease in the intestinal tubes, and the inflammation of the external or internal structures of the ear, first attended with deafness, and then going on to the formation and discharge of purulent matter, all tend to show the close connection of typhus with the exanthematous fevers.

When we turn to the consideration of the contagious nature of the disease, we arrive at similar conclusions. Almost all, we might say all, the fevers which have been clearly proved to be contagious, came under the class of the *exanthemata*. The plague, small-pox, measles, scarlet fever, all are eruptive diseases; and this seems a very strong fact in favour of the exanthematous nature of typhus. Experience seems to prove that typhous fever is generally contagious. But it has never been proved that ague, remittent or bilious fever, or yellow fever, are ever communicated by infection to healthy individuals, unless these were also exposed to the same causes which originally produced the disease, viz. to marshy or putrid exhalations.

We shall now glance at the arguments which may be urged against typhous fever being classed under the exanthemata; and first as to the appearance of the rash.

An eruption, it is allowed on all hands, is a pretty constant attendant on typhous fever, so much so, indeed, that when a similar eruption is observed during the course of other fevers, they are then said to have taken on typhoid symptoms. Now, all authors have agreed to call this the *petechial* eruption; and when it occurs in a marked degree in other febrile disorders, it gives the disease a character so peculiar, as to have induced some authors to describe them as distinct varieties. Thus, we have the petechial tertian of Wedel, and the petechial quartan of Bartholin. In the exanthematous fevers, the character of the eruption is always the same, differing merely in its greater or lesser vivid tint, according to the violence of the attack. But the eruption in typhous fever presents by no means the same unvarying character; sometimes it consists of little more than a blush on the skin; sometimes of an aggregation of minute reddish or purple points; at other times they are as large as pease, and of a deep purple or blackish colour; or they may present that peculiar appearance which has been described under the name of vibices, &c. That the rash of typhus is the same as the petechial eruption of authors, seems even proved by two of the cases related by Dr Roupell, where what he calls petechiæ appeared on the third day of the disease, and yet one of the patients had completely recovered by the tenth day.

It is the character of all the exanthematous fevers with which we are acquainted, that within a fixed period after the person is seized with febrile symptoms, an efflorescence or rash characteristic of the eruptive disease makes its appearance, and after a certain number of days, it reaches its acme, and then gradually fades away. This fact has been so often noticed that it may be regarded as established. Now the rash which appears in typhus has no fixed period for its appearance, nor yet for its decline; and in the very cases selected by the author to prove the analogy of this rash with that of the exanthematous diseases, we find this exemplified; for, in different cases, the rash appeared on the third, fourth, fifth, and sixth days. This is taking it according to his own showing.

But as all authors have described the petechial eruption as being the same as what he calls the rash, we find that the first appearance of the eruption is not by any means confined even to the first week, for it is mentioned as occurring at the end of the second week of the disease, and during all the intermediate periods. Now, no such instances of irregularity, nothing, at least, comparable to this, occur in the exanthematous fevers. In them the eruption may, from particular circumstances, appear a day sooner or later; but in the great majority of cases, the eruption appears at fixed periods, and having run its course, fades, and does not again appear. If the appearance of the rash or eruption is limited to no fixed periods in typhus, it is no less so in its decline. Thus, we find, even in the cases narrated by Dr Roupell, that it has disappeared after continuing out for *three days*, and also, in one case, that at the end of a *month* it was still visible.

The affection of the bowels can never be considered as an argument for a disease being of an exanthematous nature; for in cholera, dysentery, yellow fever, ague, and gastric fever, the bowels are more or less affected; yet no one would ever presume to enumerate these diseases amongst the exanthemata. But even if affection of the bowels were allowed to be an argument in favour of an exanthematous nature, how could that account for the anomalous fact of typhus in this country being so very rarely complicated with affection of the bowels, and so very constantly on the Continent, so much, indeed, so, as to have induced several of the most distinguished of the continental physiologists to consider the affection of the bowels as the primary disease, and the typhoid symptoms but the necessary consequence of this lesion?

If we look to the effects of treatment in typhus we shall arrive at the same conclusions. It is proved that violent measures,—anything, in fact, which will give a shock as it were to the system, will prevent the invasion of typhus even after the premonitory symptoms have shown themselves. No one has ever attempted to show that any such thing is even possible in any one of the exanthematous fevers. Then again, even after the fever has been fairly formed, it is found that appropriate treatment may cut short the disease, and the patient may be restored to health within a week. Treatment has no effect over the *exanthemata* so far as to arrest the progress of the disease; it may render the disease much milder, or the disease may of itself be so mild as never to confine the patient to bed; but the whole train of phenomena passes through the same course as if the attack were of a much more severe character.

The exanthematous fevers possess another property, which appears to be very satisfactorily established; viz. that, excepting on very rare occasions, they occur but once during the course of life. Now if typhus were one of these, the same would undoubtedly hold good; but it is far otherwise; and no fact seems better established than this that a person may be seized with typhous fever over and over again; nay more, that one attack does not even secure an immunity from the disease for any lengthened period.

Allowing that typhus were infectious would by no means prove that it was an exanthematous disease. If a case of yellow-fever occur amongst a ship's crew it spreads rapidly, and the same appears to happen in some varieties of dysentery, and in cholera. But it is by no means proved that typhous fever is really contagious. In particular circumstances it may be so; but most of the cases may be explained on the assumption that those infected were exposed to the influences which originally caused this disease; and the continental physicians almost to a man deny its contagious nature. This circumstance is often illustrated in this country. During the prevalenee of typhus, a child may be seen sucking the milk of its mother labouring under typhous fever, and yet the child very rarely takes the disease.

If again, typhous fever were of a specific nature, how could intermittent, gastric, continued, inflammatory, nervous or putrid fevers pass into typhus, as Hildenbrand and others affirm they frequently do?

Such are the chief arguments which may be advanced both for and against the exanthematous nature of typhus. Too little attention has yet been paid to the disease with the view of determining this point; but it is to be hoped, now that the subject has attracted notice, that facts will be collected which will either establish or nullify the question. We, in the meantime, refrain from offering any remarks on the subject, leaving it to our readers to judge for themselves.

The next subject treated of by Dr Roupell is the "power of spreading by infection," possessed by typhous fever. As we have mentioned this subject above, it seems only necessary to state, that Dr Roupell, in common with most British practitioners, believes that typhus is "readily communicable during life," and narrates a number of instances where the contagious nature of the disease appeared to be clearly proved; and most of the facts collected in this country go to prove the same.

The author then enumerates the causes of typhus, beginning with that of Dr Thomson, who observes, that "typhous fever, small-pox, measles, hooping-cough, scarlatina, and hospital gangrene are communicated not only by actual contact, but also by the transmission of an effluvium from the fomes or original source of infection, through the medium of the air." He then notices the opinion of the elder Hildenbrand, that the *miasmata* which produce typhus may arise at all times; that air overcharged with human exhalations is the cause; and that it has the power of self-extension.

This opinion was, long previous to the time of Hildenbrand, promulgated by Lord Bacon, Sir John Pringle, Dr John Hunter, Sir Gilbert Blane, and the philanthropic Howard. But Hildenbrand does not limit the origin of typhus to one cause alone; for he mentions no fewer than four which may produce the disease; *first*, effluvia from the bodies of men, whether healthy or sick, but especially of the sick if confined in crowded apartments; *second*, a certain degree of colliquescence, if it commences in acute fevers with obstinate dryness of the skin, and the faculty of conducting imponderable agents remaining unimpaired; *third*, the mephitic exhalations from stagnant waters; and *fourth*, continued moisture of the atmosphere, and exposure to scorching winds.*

A few examples are quoted from the older authors of the virulence of the contagion arising from animal effluvia. The author, however, thinks something more is necessary than mere exposure to putrid animal effluvia, and from Dr Elliotson's papers in the Medical Gazette, quotes the assertion, that typhous fever is not met with amongst the Kamtschadales, who live in holes under ground, crowded together in the most disgusting state of filth, and living on substances in a state of putrefaction; that it did not attack those who escaped from the black-hole of Calcutta; and repeats from Howard the statement that the prisons of Venice, Naples, St Petersburgh, and Moscow, are not obnoxious to the disease; in fact, "that typhous fever is not present on numerous occasions, when all its supposed causes are in operation." But this fact was so well established by the elaborate and learned observations of Dr Bancroft, that it seems unnecessary to enlarge on it. That writer, it may be remembered, had shown that neither butchers, nor skinners, nor horse-killers, or others constantly surrounded by, and breathing putrid animal effluvia, are more subject to typhoid fever than men of other occupations.

The opinions of M. Broussais and of M. Louis on the cause and origin of typhus are shortly noticed. These authors consider an alteration in the mucous membranes to be the cause of the symptoms; M. Broussais referring the chief or primary affection to the stomach, and M. Louis to the small intestines. The peculiar form of fever which prevails on the continent may easily explain the reason of these distinguished pathologists placing the chief seat of fever in the stomach and intestines. The fever most prevalent is a gastro-enteric typhus; and the lesions most constantly found after death occur in the intestinal canal.

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* Valentini Nobilis ab Hildenbrand, Institutiones Practico-Medicæ, Edidit filius Franciscus Nobilis ab Hildenbrand, Viennæ Austriæ, 1825, Vol. iv. p. 443.

On the question, whether the circumstance of having been once attacked with the disease, gives an immunity for the rest of life, Dr Roupell infers that it does not; and he mentions two instances as having come under his own knowledge, where the one individual had three different attacks, and the other not fewer than seven. Had Dr Roupell made inquiry amongst his medical brethren he might possibly have been able to enumerate many similar instances; for the fact of an individual suffering two or three attacks seems to be by no means of rare occurrence. Hildenbrand considered that those who had an attack of typhus, particularly if severe, enjoyed an immunity "*per plures annos*," and that if again attacked with the disease it was always of a milder form. In several cases, however, which have lately occurred, this does not seem to hold good, inasmuch as the second was the more severe attack, and in one case the second attack came on in little more than three months after the first.

The author next adverts to the supposed immunity from typhus which is afforded by age; and mentions the opinions of MM. Chomel and Louis, that very young children and persons above the age of forty very rarely suffer from the disease. M. Louis is certainly wrong in stating that the disease is never seen in children under thirteen years of age, or in adults above the age of forty. Infants at the breast appear to possess a kind of immunity from the disease, and though children under ten years of age are not so subject to the disease as those of riper years, still it is quite a common occurrence amongst them. Neither is it found in this country that adults above the age of forty escape the ravages of this disease. Dr Roupell, it is true, seems half to agree with the French physicians as to the immunity from typhus afforded by age; at least he contents himself with stating that there may be exceptions to this rule, and instances *two* cases of typhus in children of three years of age; and *one* in a man above fifty. Surely St Bartholomew's Hospital Reports must show many more cases than these. It is fortunately in our power to refer to the Medical Reports of cases treated in two Scottish hospitals, which clearly show the fallacy of M. Louis's statement. Dr Arrott,* in his Medical Report of the Royal Infirmary of Dundee, mentions the number of fever patients admitted into that hospital as 700. Of these 32 cases were under ten years of age; 36 between forty and fifty; and 22 above fifty years. Dr Craigie,† in his Clinical Report of the cases treated by him in the Royal Infirmary of Edinburgh, mentions the number of cases to have been 174. Of these 19 cases were under ten years of age; 19 were between forty and fifty, and 20 above fifty years of age.

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* Edinburgh Medical and Surgical Journal, Vol. li. p. 128.

† Ibid. Vol. xlvi. p. 35.

The average duration of the disease the author considers to be about three weeks or twenty days. He thinks, however, that "all the essential processes may be gone through within a week;" and that the mere circumstance of the prolongation of the fever for three weeks does not necessitate its being attended with typhoid symptoms. A few cases are narrated in proof of his statement.

With regard to the appearance of petechiæ, the author remarks that they have been generally confounded with the peculiar rash; but may be very easily distinguished from it by the test of pressure, which removes for a moment or two the appearance of the efflorescence, but has no effect on the petechial spots,—these depending on effused blood. He mentions that effusions of blood are common to typhus and the exanthemata. These he represents to consist of hemorrhages from all the mucous membranes, as that of the nose, lungs, bowels, uterus, and kidney; and adds, that "hæmoptysis and epistaxis are mostly seen early in the disease, whilst hemorrhage from the bowels comes on at a later period." He also adverts to the fact, that these bleedings usually occur at "one of two distinct periods, the first on or about the third day of the attack, the second on the fourteenth day, or later." To illustrate this, he narrates a few cases where the different forms of hemorrhage occurred. He also notices a circumstance to which our attention has been more than once called during the prevalence of epidemic typhus, viz. that the bleeding from leech-bites is often extremely profuse and difficult to be stopped; a fact which it is important should be borne in mind, as the bleeding from a few leeches will very frequently depress the system much more than was intended, or rendered desirable by the state of the patient.

The hemorrhagic tendency, he imagines, is owing to an altered state of the blood, and probably also to a morbid condition of the vascular system. That the hemorrhage may be owing to a deficiency of certain natural changes in the blood, he thinks, is "proved by the fact, that in the *morbus cœruleus* there is, with other signs of diminished vigour in the system, a tendency to hemorrhage, even to a fatal extent." He quotes also Mr Mayo's opinion, that the constitutional hemorrhagic tendency met with in some individuals, depends on the state of the vessels alone; that the minute vessels instead of closing continue open, and have no disposition to contract.

With regard to this constitutional hemorrhagic tendency, it is worth while to notice a fact which lately came under our own observation; which was, that in a boy, in whom this unfortunate idiosyncrasy existed, we distinctly ascertained that there was deficiency of fibrinous matter in the blood. Considerable importance ought, however, to be attached to Mr Mayo's opinion, for in this case, two days after the receipt of the injury, on examining the surface of the wound with a pocket lens, the blood was distinctly seen oozing out from small minute points.

Dr Roupell considers the "hemorrhage which occurs in typhus very nearly allied to inflammation, or, in other words, that we see inflammatory action readily produced in those parts which are the seat of hemorrhage, either coexistent with it, or coming on afterwards." He considers the occurrence of erysipelatous and phlegmonous inflammations as fair examples of this connection; and he narrates five cases where the inflammatory action assumed the erysipelatous, and a like number where it took on the phlegmonous form; terminating in all these last cases in abscess. One case, too, is given, where, after great intestinal irritation, copious discharges by stool of fœtid purulent matter took place; the patient, however, recovered.

He agrees with Mr John Hunter and Dr Thomson in thinking that the erysipelatous, the carbuncular, and gangrenous inflammation are closely united; and illustrates his statement by a few interesting cases, where these different forms of inflammatory action were observed during typhus.

The next series of cases is intended to illustrate the fact, that the serous membranes are frequently implicated in this disease, giving rise to the various complications of *peritonitis*, *pleuritis*, *meningitis*. One of these cases we quote entire.

"Stephen Clarke, aged 19, was admitted into the Seaman's Hospital, on the 6th of June 1831. At that time his face was flushed, his eyes suffused, and his skin covered with small red spots, and he was perspiring profusely. He complained of pain in all his limbs, and in the right side of the chest on coughing, or on inspiring deeply, his pulse was 120, weak and small, but still with sharpness, tongue thickly coated with a dirty fur. He was exceedingly depressed in spirits. On auscultation, fine crepitation was heard at the base of the right lung posteriorly. On the following day he was better, but the pain in the head continued. Much of the activity of the attack was overcome by the measures resorted to, but still the pain in the head remained very severe, and lasted throughout the whole of the month of June; towards the middle of July his hair fell off. On the 21st of that month it was observed that the frontal suture gaped, and he stated that his head was several inches larger in circumference than before his illness. This was proved by the fact that his hat, previously too large, was now infinitely too small. His head measured on the 21st 1 foot 11 inches in circumference, and on the 27th was one-quarter of an inch larger.

The headach was relieved by the opening of the sutures, which took place to such an extent that the finger could be laid between the frontal and parietal bones. August and September passed away, and he still continued much the same, able to go about, but occasionally suffering severe pain in the head. In November the head was still more enlarged. In December the pain diminished, and the head was found to have returned to its former dimensions, and he was eventually discharged quite well. He called on me this spring, 1838, making no complaints of his former attack."—P. 107, 108.

Cases are also given where typhous fever was followed by, or attended with, ulceration of the bowels, with *pneumonia*, or with irregularity of the pulse.

It has been generally imagined that all the appearances observed in typhous fever are met with in other complaints, and that most fevers may terminate in typhoid fever. To determine the truth of this the author proceeds to consider what are the leading features in typhus, and what are the parts primarily affected; and first of the typhoid symptoms.

His own views are as follow:

" After venesection, parturition, or injury of any part of the body, there follows more or less constitutional excitement, with a tendency to the formation of pus, accompanied by a dry and hot skin, black tongue, muttering delirium, *subsultus tendinum*, stupor, and many of those formidable symptoms that characterize severe attacks of typhus. These symptoms are now properly referred to inflammation of the inner lining of the veins, and it seems therefore a fair inference to be drawn, that although the cause in the two cases may be different, yet that the effect in both is the same; and that both in typhus and the peculiar form of typhoid fever which results from injuries, inflammation of the vessels, and the consequent admixture of morbid secretions from the inner membrane with the blood, is the cause of the serious and alarming symptoms which arise, as well as of the secondary lesions."—Pp. 118, 119.

He then, in support of his opinion, quotes several of the authors who have written on inflammation of the veins, and mentions the fact of its being attended with typhoid symptoms; and sums up his opinion in the following words.

" Thus we see that inflammation of a vein, and admixture of morbid secretions from the inflamed part with the blood, causes on ordinary occasions typhoid symptoms, and gives rise to a fever attended by *subsultus tendinum*, low muttering delirium, and a black tongue. The similarity of the symptoms in phlebitis, and in one stage or period of typhus, gives reasonable ground for belief that the corresponding appearances in the two diseases arise from a not dissimilar cause, and hence we see an explanation of one great train of effects in typhus, and learn how typhoid symptoms appearing in various diseases, both chronic and acute, may easily and naturally be confounded with real typhus. Hence also we see how readily what is called spontaneous typhus can be generated."

Again, " This justifies our admitting with M. Chomel that any fever may assume the features of typhus, and has led no doubt to the belief in the conversion of one into another, and that an essential difference may exist in the species of a disease at the commencement and termination of its course, but such an adventitious occurrence of typhoid symptoms no more deserves the name of typhus, than spasm of the larynx arising from fits in children merits the appellation of hydrophobia."—Pp. 124, 125.

The next subject considered is Hæmorrhage, and of this he treats rather more fully than in the former part of his treatise; but as his chief facts and conclusions have been already noticed, it seems unnecessary to repeat them.

Erysipelas appeared in one-seventh of the cases of typhous fever treated by Dr Roupell in 1831, and quite as often in the later epidemics. This inflammatory action usually came on during the third week of the fever, and if it did not occur spontaneously, the slightest cause was sufficient to produce it. He mentions, too, that in whatever situation it might appear, or however excited, it almost always assumed the phlegmonous character, and terminated in the formation of purulent matter. He thinks, " no doubt can be entertained that this form of erysipelas is contagious," " for it is notorious that those seasons which give rise to typhus generate also erysipelas." He has not, however, been able to satisfy himself of the possibility of one person contracting typhus from another labouring simply under erysipelas.

He quotes from Mr Lawrence's treatise on erysipelas to show that the same causes which generate phlebitis, also produce erysipelas, and he thinks it therefore allowable to infer that they are in some way connected. " The occurrence, then, of erysipelas," says he, " in no way weakens, but, on the contrary, tends to confirm, the idea, that many of the symptoms in typhus are occasioned by inflammation of the vessels, which we are told by a high authority is the very essence of erysipelas." The high authority referred to is M. Ribes, who, both in simple and in phlegmonous erysipelas, found the veins reddened, thickened, and coated internally with a false membrane.

We are rather at a loss to perceive what the author wishes to prove from these statements with regard to the occurrence of erysipelas during the course of typhus, seeing there is scarcely a disease to which the human body is subject, which may not be complicated with an erysipelatous attack; and in particular seasons the slightest scratch is sufficient to give rise to the disease.

The author then makes a few observations on the formation of purulent deposits in typhus, and concludes by saying that, " typhus shares with other eruptive diseases a tendency to the formation of pus, should the disease not be checked in its early period." He ought, perhaps, to have said febrile diseases; for it does not appear to have been shown that the tendency to the formation of purulent deposits is limited to the eruptive diseases.

The sloughs which form on the parts of the body most exposed to pressure he says, depend on an " intricate combination of circumstances." But after quarrelling with the ordinary modes of explaining their formation, he forgets to tell us his own peculiar views, unless they may be gathered from the following passage.

> " The above leads us naturally to consider whether the arteries may not in all instances be implicated, and their circulation checked by inflammation: this I am not prepared to maintain, but it is highly probable that such is in many cases the fact, while the condition of the fluids may be chiefly instrumental to this process in others, for it takes place late in the disease, when there is a decided alteration in their character, accompanied by symptoms of extreme debility and a general proneness to decomposition."—P. 144, 145.

The next topic discussed is the peculiarity of the inflammation in typhus. He agrees with Mr Hunter, that it has little of the adhesive tumefaction in it, but more of the œdematous; and that this is sufficient to account for the peculiar diffuse form which inflammatory action assumes in typhous fever, seeing there is no deposition of coagulable lymph to confine the morbid action to one spot.

He then adverts to the influence of the nervous system over the circulating fluid, remarking that whatever diminishes the nervous influence has an injurious effect upon the blood, lessening its power of coagulation and impairing its vitality. " This," says he, " with other causes, tends in my belief to produce that series of phenomena so commonly appearing both in this and in eruptive fevers, and known by the name of putrid symptoms." To the consideration of these symptoms he next passes.

" Want of power in the blood to coagulate, utter prostration of strength, effusion of fluid from the vessels, ready mortification of the parts, with a tendency to decomposition, and extrication of gaseous matter," form, according to the author, " a diathesis or state of the system commonly denominated putrid." He goes rather far in his assertions, with regard to this putrid state of the system, when he says, that typhus and the other exanthemata seem invariably to develope or generate this condition in all constitutions. His subsequent remarks, if they prove any thing at all, show that if typhous fever or other severe diseases attack a constitution enfeebled from any cause, the type which that disease is most apt to assume is the typhoid or putrid.

The irregularity observed in the pulsation of the heart, he is inclined to refer partly to " injury of the brain," and partly to the sympathetic influence which other internal organs are known to exert over the action of the heart. He accounts in this last way for the irregularity of the heart's action observed in two of the cases he has narrated, where inflammatory action was lighted up in the lungs and in the bowels.

On the state of the nervous system in typhus, he remarks, that all the principal causes of cerebral affections, such as irritation, pressure, inflammation, and inanition, are met with in typhous fever. Thus the watchfulness, headach, suffusion of the eyes, maniacal delirium, &c. characterize inflammation of the meninges in its various forms; whilst congestion of the vessels, effusion of lymph, purulent matter, or serous fluid, the consequences of inflammatory action, appear in company with symptoms both of pressure and of irritability. The symptoms of inanition again generally come on late in the disease; and it occasionally happens that patients who have passed successfully through all the early stages sink at last from the effects of mere debility.

The furious delirium and tremors of the limbs in typhus, he considers to arise from irritation in the membranes of the brain, and to be precisely similar to that produced by the abuse of alcoholic liquors. That in *delirium tremens*, and also in typhus, the irritation is caused rather by vascular congestion than by the presence of serous fluid, or other morbid products, may be regarded as proved by the fact, that in many fatal cases no serous fluid is found.

Deafness, he remarks, is one of the most constant symptoms attending typhus; in some cases followed by the discharge of purulent matter from the ear, which generally dries up on recovery. This is not always connected with organic mischief within the cranium, as many cases occur of even complete deafness where the head remains free from pain, the mind clear, the memory good, and the countenance intelligent. M. Louis has rightly attributed this to inflammation of the *meatus externus* of the ear, and not to any disease of the tympanal cavity or labyrinth:

The affection of the intellect, the author considers as somewhat peculiar in typhous fever; and he narrates several cases in order to exemplify what he means. We do not perceive, however, that the symptoms in these cases bear out his assertion, as all the delirious or maniacal or suicidal symptoms occur equally in other diseases where there is affection of the brain. The vascular system, and especially that of the brain, we know, is seriously disturbed in typhus, —to such an extent, indeed, as easily to account for all the varieties and peculiarities of delirium met with during the continuance of the disease.

We now come to the consideration of the morbid changes in typhous fever. From the circumstance of cases frequently occurring where no morbid changes can be discovered after death by any of the ordinary means of investigation, Dr Armstrong was led to conclude, that the unfavourable issue was owing chiefly to "actual exhaustion of the vital principle induced by the previous excitation." It is more common, however, to meet with such organic changes as satisfactorily account for the unfortunate termination of the disease; and the author arranges these under various heads, according as they occur in the vascular system, the glandular structures, the membranous tissues, or the parenchyma of organs.

In this department, instead of describing the pathological conditions of the structures affected in typhous fever, Dr Roupell enters upon long comments on the physiology of the parts affected, and the symptoms which accompany the organic lesions discovered on dissection, which is necessarily attended with much repetition of his former statements.

"The poison of typhus," says he, "occasions irritation of the minute blood-vessels." This poison may enter the blood by inhalation or absorption; or the blood may be contaminated by a wound. But this is not enough to produce the disease; there must be local action from the commencement, and "this must be upon the inner lining of the blood-vessels." He considers this is illustrated by what takes place in inoculation or vaccination, the local action there preceding the constitutional affection. From the fact of the system receiving the specific infectious diseases, as scarlet fever, small-pox, &c., only once during life, he endeavours to prove that the morbid actions do not depend solely on changes of the circulating fluid. If it were so, as the fluids are constantly changing, the blood would soon again become capable of receiving the disease. He thinks, however, that "the nervous system is clearly altered in its sensibility to certain stimuli;" hence he concludes, that the infection of small-pox fails, when the system has been once infected, "from inability of the nerves to receive the necessary impression." In the next sentence, however, the nerves are quite forgotten, and we are told that the "constitutional symptoms arise from an impression on the vessels." This again he considers proved by the fact, that "the system may be fully saturated with a poison, and yet exhibit no external symptoms of its presence, and that the fluids may be so impregnated as to convey it to others, and yet the person primarily affected remain unconscious of its existence." The examples he gives of this are curious in their way; and we confess we are unable to perceive their connection with his assertions. We give the passage referred to at length.

> "There are many known instances of persons who have died at advanced ages from natural decay induced solely by time, who never had small-pox, although their systems were many times polluted with the virus by inoculation. Among my own acquaintances is a gentleman now 70 years of age, who has hitherto resisted all infection by small-pox and vaccination, both natural and artificial."—P. 183.

Had he given as an illustration the case which he afterwards quotes for a different purpose, it would have been more in point. But unfortunately for his hypothesis it is a case which, if anything could, proves that it was the circulating fluid, and neither the blood-vessels nor nerves, which was "saturated with the poison." The case, which he says is well authenticated, was this: A lady, in the family way, was exposed to the contagion of the small-pox, but was not herself affected, except by disgust at the sight of a person labouring under that loathsome disease. She shortly afterwards gave birth to an infant, which went through all the regular stages of small-pox. This case compels him to admit that the circulating fluid is capable of communicating the disease to another. After a few further observations he proceeds to consider the changes which the blood undergoes in typhous fever.

Whatever difference of opinion may exist as to the part of the system primarily affected, few will hesitate to admit that during the progress of the disease the blood undergoes material alterations. Blood drawn from a person labouring under typhous fever, even when inflammatory symptoms are present, is materially different from that of a person in the first stage of pure inflammatory fever. In many cases the blood neither presents the buffy coat nor is cupped; in a few it partially retains its fluidity. These changes have not been very satisfactorily accounted for, and Dr Roupell throws no additional light upon the subject. The blood owes its coagulating property to the presence of fibrinous particles. Is it possible that the disease produces such a change on this constituent of healthy blood as to convert it into albumen? Our own researches have not been sufficiently numerous or accurate to enable us to speak positively on this subject; but we throw out the hint for future observers.

The changes in the blood-vessels have been more carefully studied, and yet their exact condition and the velocity of the circulation of the blood through them, when in a state of inflammatory excitement, has not as yet been clearly demonstrated. It has even been disputed whether the increased redness and injected appearance presented by the inner coat of the blood-vessels after death was produced by the intensity of the inflammatory processes, or was merely the result of dyeing of the membrane by the colouring matter of the blood. On this point the author asserts, that, if any external agent or poison should produce an exanthematous disease, the minuter vessels will become obviously and immediately excited, and that, therefore, we are entitled to conclude, that all the morbid changes which we find in those structures after death, are to be considered as having been caused by this morbid excitation of the vessels. He contends that the arterial coats when inflamed, most readily throw out fibrinous matter, whilst serous and purulent fluids are most abundantly thrown out by the veins; and he leaves us, from this statement, to draw the conclusion, we presume, that because serous and purulent deposits occur most frequently in typhoid disorders, it is the venous system which is most affected.

The changes which occur in the glandular structures are next commented on in the same manner. The morbid appearances are usually met with in the parotid and submaxillary glands, and in the glands of the intestinal tube. Several of the continental physicians, as MM. Louis, Bretonneau, and Chomel, have endeavoured to prove that the essential organic lesions in typhoid fever arise from certain changes in the glandular follicles of the mucous membrane of the small intestines. This organic affection is generally noted as being attended with more or less diarrhœa; and ulceration of the intestine is consecutive to the glandular disease. The diseased appearances of these glands vary from slight enlargement to that state in which they present much redness and enlargement, with the mucous and cellular tissues of the intestinal tube so united that they cannot be separated. This state rapidly proceeds to ulceration, at first superficial, but afterwards spreading through the whole thickness of the intestinal coats. In some instances a peculiar deposit is thrown out into the submucous tissue, of a pale or yellowish red colour, and a line or two in thickness. Dr Roupell finds fault with the statement of MM. Louis and Chomel, that certain changes in the intestinal glands, leading to the production of ulceration, are essential to the production of typhus. He does not state his reasons why he so dissents; but it may be gathered from what he elsewhere says, that it is because fatal cases of typhous fever occur every now and then, in which no organic lesion can be detected in any part of the intestinal canal. The glandular affection in the intestinal tube appears to be of much more common occurrence on the continent than it is in this country; but it has been met with sufficiently often, to induce physicians to pay strict attention to the occurrence of any abdominal symptoms, and to the character of the feculent discharge during the progress of the fever.

The lymphatic glands of the mesentery are often found enlarged and reddened, and sometimes contain purulent matter; but this occurs chiefly when ulceration of the intestinal follicles has previously taken place. With regard to the parotid and submaxillary glands, he merely mentions that they are often affected, but takes no notice of the alteration of structure produced in them by the inflammatory processes.

The morbid alterations of structure in the mucous membranes Dr Roupell considers chiefly to consist in softening, staining, in-inflammation and ulceration. Affection of the lining membrane of the lungs he considers to be one of the most constant appearances after death. That of the bronchial tubes is generally of a red or violet colour, becoming deeper in colour towards their more minute subdivisions, and often covered with a bloody secretion. The côlour, however, he regards as frequently depending on transudation.

He again alludes to the occurrence of ulceration in the intestinal tube, this chiefly " occurring over the patches of glands." He also briefly notices Dr Yellowly's observation on the appearances presented by the villous coat of the stomach, and adds, that " ulceration has been found in the parietes of the stomach, and sometimes, though rarely, in the duodenum."

The genito-urinary mucous membranes in some cases present unnatural redness; and in one case purulent matter was found in the Fallopian tubes.

Suffusion of the conjunctiva he regards as indicative of the " conditions of the other branches of the internal carotid," as this suffusion appears simultaneously with the cerebral disturbance, or soon after.

" Turbulent and flocculent secretions" are found effused between the membranes of the brain; and occasionally a false membrane has been met with on the " inner surface of the *dura mater.*" Increased vascularity of the *pia mater* the author regards as of constant occurrence, and fluid is very generally found effused within the ventricles of the brain, and into the theca of the spinal cord.

The affections of the serous membranes are next noticed. He thinks that inflammatory action of the arachnoid membrane is proved by the fact of its being occasionally met with quite opaque; but he is very doubtful whether " disturbance of the brain can ever arise from inflammation of the arachnoid membrane."

With regard to inflammatory affections of the *pleura* he remarks, that during typhus they go on without the acute pain and hurried breathing so usually attendant on inflammation of that membrane. His explanation of the mode in which the *pleura* becomes affected is peculiar. " The *pleura*," says he, " does not appear to suffer from a direct action of the typhoid poison, nor indeed do any of the membranes of this class, but seems to become involved by the spreading of inflammation from the contiguous tissues or other causes." He forgets to inform us how this is proved; but we see nothing to prevent the *pleura* being as directly affected by the typhoid poison as any of the other serous or mucous membranes.

With regard to the morbid changes met with in the peritoneal membrane, he mentions that ulceration producing perforation of the peritoneal coat is met with in France, but is rare in this country.

The morbid changes produced in the lungs he represents as consisting of consolidation at the base of the lungs, a change which he has also seen in the upper lobes, and purulent secretion and abscesses throughout their structure. Of the diseased appearances in the brain he only says, that the brain is rosy and injected according to Louis; that abscesses in the brain and *cerebellum* were observed by Sir John Pringle; or that effusion may take place, he does not say where, as in one of the cases he has narrated.

For these brief sketches of morbid appearances, the author refers to Sir John Pringle, Hunter, Louis, or Chomel. It is much to be regretted that, in a work professedly treating of *one* disease, the author should have so much neglected this important part; for it cannot be denied that the treatment of the disease must be founded on a full and accurate knowledge of the pathological conditions of the organs of the body. We may be allowed to say, that, had he described the morbid anatomy from personal observation, it would have added both to the interest and the value of his work.

After some sensible remarks with regard to the importance of ascertaining the nature of the disease before we proceed to its treatment, Dr Roupell gives an account of the effects of different remedial measures.

" Bleeding," says he, " during the earlier stage of the disease, is to moderate action and to control power, but it is resorted to later in the disease to relieve local complication; hence general depletion must chiefly be confined to the first periods, though it may be called for and even advisable in all." He does not consider blood-letting to be indicated in the milder cases; it is only when the attack is more severe, or when some internal organs are implicated, that he advises to have recourse to the lancet. He cautions against bleeding to faintness in typhus, considering it quite enough to carry it the length of affecting the nature of the pulse. Leeching and cupping he considers to be most important auxiliaries, as they can be employed when venesection would evidently be improper.

Emetics are highly commended; and when used early, when general uneasiness and chills are felt, with other threatenings of an approaching attack, Dr Roupell has found the exhibition of an emetic put a stop to the disease. Even after the symptoms of fever are formed, he considers emetics as still advisable, particularly if administered after blood-letting; but after the third day of the fever their efficacy is more questionable.

The utility of purgatives in typhous fever has long been established; for by removing from the bowels undigested matters or disordered secretions, by obviating constipation, and aiding generally the antiphlogistic regimen, they materially assist in bringing the disease to a favourable termination. At the commencement of the disease, after the action of the emetic, he recommends a powerful cathartic to be given, both to evacuate the bowels thoroughly, and to reduce the action of the system. He employs as the best combination for this purpose, calomel combined with jalap or rhubarb, and followed in a few hours by a draught composed of the infusion of senna with manna or the sulphate of magnesia. During the progress of the disease he prefers the saline purgatives, from their acting at the same time beneficially on the circulating fluids. These he gives in small and repeated doses during the whole course of the fever. He considers the mixture of the *Liquor Ammoniæ Acetatis* with sulphate of magnesia to be a medicine of decided efficacy.

Mercury given as an alterative, or as a means of gently exciting the secretions, he finds useful when the tongue is dry and the skin is hot, provided that no irritation of the bowels exist to contra-indicate its employment. The author considers there are three conditions, during the continuance of which, mercury, given so as to produce its specific effect, is highly advantageous; *first*, when active inflammation of the brain has been established; *second*, when inflammation of the lungs has gone on to hepatization; and *third*, when ulceration has taken place in the bowels. For the last of these organic changes he thinks no remedy can compete with the *Hydrargyrus cum creta*, which, when combined with an equal weight of Dover's powder, constitutes an excellent formula.

Saline substances have been administered during fevers, both with the view of diminishing the morbid heat, and of producing a favourable change in the blood. It has been found that certain salts when mixed with the blood rendered it of a more florid hue and more stimulating to the heart and other organs; and those salts which have exhibited this effect most powerfully have been highly approved of. Such are the muriate of soda, the carbonate of soda, and the chloride of potash. Other saline substances are, however, more usually employed, as the tartrate of potash or soda given during effervescence, the nitrate of potash, or the solution of the acetate of ammonia.

Tartar emetic in large doses was given by Professor Rasori with the very best effects in fevers attended with petechial eruptions. In this country it has rarely been employed in typhoid fevers in this manner, though it is very frequently used in those smaller doses which produce nausea, sweating, and frequent liquid stools. Dr Roupell appears to have employed it chiefly to induce nausea, and only in those cases where there was " inflammatory action and strength."

The cold affusion the author appears never to have tried, and he argues against its employment as " too inconsistent with the feelings and habits of ordinary society." It is a remedy which has been too much neglected of late, much more, indeed, than its merits deserve. It might have been expected that Dr Roupell, who is so fond of illustrating the phenomena of typhous by those of scarlet fever, would have been led, from the beneficial results of the cold affusion in this last disease, to try its effects also in the typhous fever, but he has not. He recommends, however, pure air, cold sponging, and cold drinks. Of course no one would ever think of employing the cold affusion or even general cold sponging if inflammatory action were going on in the lungs or bowels. The application of cold to the head is useful in most cases.

Stimulants, the author considers to be absolutely necessary at certain periods in many cases of typhus. The object ought to be to " counteract mere debility, or to remedy an actual morbid condition, when after active determination to a part, congestion continues, and gives rise to symptoms of irritation." They are in general to be avoided in the earlier stages, but are occasionally indispensable both early and late in the disease. If employed in the earlier stages of the disease, Dr Roupell thinks they should only be employed on an emergency, and be abandoned as soon as the immediate object for which they were given has been attained, and the powers of life have been roused. He quotes from Bateman a case illustrative of his statement. Under the use of stimulants, delirium and convulsions will subside, diarrhœa cease, a dry tongue become moist, the feelings of langour depart, strength be acquired, and consciousness restored. To know the proper moment for the administration of stimulants has always been one of the chief difficulties in practice. The great object in every case is to " maintain strength enough in the heart to enable the circulation to continue;" and stimulants may consequently be given in every stage of complication and in every stage of the disease, provided the heart is unable properly to exercise its functions. He mentions that the presence of flushing of the face, redness of the eyes, increased heat of the skin, delirium so violent as to render even coercion necessary, may all be attended with true symptoms of debility, and call for the employment of wine or brandy, which, far from aggravating the symptoms, will often at once relieve them, and lead to a rapid recovery.

He speaks highly of the utility of blisters, as useful stimulants when the vessels of the head are congested, and on the eve of pouring out fatal effusion upon the brain. Sinapisms to the feet and legs he has also found highly advantageous in rousing the brain, and causing active determination to the lower extremities.

Opium has generally been considered as one of the most questionable remedies in typhous fever. Dr Roupell, however, appears thoroughly to understand the valuable properties of this drug, and also the proper time for its administration in typhous fever.

> "If, however there is any one remedy of which the advantage is undoubted—if the immediate subsidence of untoward symptoms follows the exhibition of any medicine—if future amendment be the test of utility, then is opium a valuable remedy: but it is not to be employed largely at any period, nor resorted to in the first stages, nor when stupor is present or approaching; but if given at that period of the disease when there is increased action without power, and all the signs which indicate irritation, good will invariably result." —P. 266, 267.

And again, "Vigilance is the guide to our employment of opium; this is the morbid state which opium is most calculated to remove." It is not by large doses of this medicine, but upon the right application of it, that favourable results may be expected to follow. Very small doses frequently answer; and to repeat these is safer practice than to give a large one, as the object is to soothe not to oppress the system. There is another period in typhous fever when opium or its preparations may be employed with advantage, that is during the process of sloughing.

Tonics should never be used till all the symptoms of fever have subsided, the skin become moist and the tongue clean, when the lighter bitters, as calumba, hops, or gentian may be tried. The dilute sulphuric acid with compound infusion of roses is recommended as "one of the best tonics after this or any other of the exanthemata."

With regard to the diet of patients labouring under typhous fever he is very short, as the ordinary rules applicable to the treatment of other febrile disorders will also apply to this.

He thinks the best of all prophylactic measures are free ventilation and good diet. In speaking of the establishing separate hospitals for the reception of fever patients, he remarks, "in my opinion it is both injurious to patients and hazardous to attendants, that many cases of infectious fever should be brought together; and it is my belief, that a certain portion may, without injury, be admitted into the wards of any hospital." Ventilation and cleanliness alone, he thinks, perfectly adequate to prevent the spreading of fever by infection in any dwelling.

In his concluding remarks, he again details a few of his reasons for believing this disease to be properly an exanthematous fever; and expresses his astonishment that Willan, Bateman, and Rayer should have overlooked it in their nosological arrangements.

Dr Roupell's treatise contains a good deal of valuable information, and is useful in bringing prominently forward the idea of this disease being one of the exanthemata. A serious objection to its utility, however, arises from the strange mode in which he mingles fact and opinion; and it occasionally costs no small trouble to perceive to what his observations tend. In many instances his concluding sentences are those which more properly should have stood at the head of the paragraph or article; as in more instances than one, they are not the conclusions, but the premises, on which all his previous reasonings are founded. He passes so abruptly from one subject to another, that he loses sight of that of which he is treating, and, forgetting to return to it, he leaves it incomplete. His reasoning is sometimes inconclusive; and contradictory statements occur in various parts of the work.

It is singular that the author gives no description of the prevailing epidemic which he says it is the object of the treatise to illustrate. We turned over and over again the pages to arrive at his description of the typhous fever of London, in order to compare it with that which he has quoted from Sir John Pringle, Dr Armstrong, and Professor Hildenbrand; but we could find none. Indeed, excepting the cases which occurred in his own practice at St Bartholomew's Hospital, there is scarcely a fact stated on his own authority.

ART. III.—*On the Enlisting, Discharging, and Pensioning of Soldiers, with the Official Documents on these branches of Military Duty.* By HENRY MARSHALL, F.R.S.E., Deputy Inspector-General of Army Hospitals. Edinburgh, 1839. Pp. 259.

As long as a State requires to keep up a regular army, either for the purposes of war, or for the protection of colonies, so long will the formation of that force, its regulation, and support, be a matter of importance to the community. By the constitution of many European governments, every male of the population, between certain ages, is liable to be called out as a soldier for a definite period, and either by himself, or as represented by a substitute provided at his expense, to form a part of the military force of that State. But in Britain, where every measure appearing to trench on personal liberty is viewed with jealousy, voluntary enlistment has long been the principal means of recruiting the army. In no case is this principle violated, except in regard to the militia force of the country. To make up this local force all the male population of the country between certain ages are liable, and the different towns and parishes furnish their quota by ballot according to their population. But as in the militia regiments substitutes are received, who voluntarily engage to serve the limited time for a bounty offered by the principal, a great portion even of this local force is procured by voluntary enlistment.

Posterior to the period when, as a consequence of feudal tenures, military services were due by every vassal of the crown, the British army was supplied with soldiers raised under the authority of Parliament chiefly by impressment. During the last century many acts of Parliament were passed with particular reference to this mode of supplying men for the army. In 1704, an act was passed, enabling all Justices of the Peace to take for soldiers all such able-bodied men as have no lawful calling or visible means of livelihood. Even so late as 1778, an act was passed for the more easy and better recruiting of his Majesty's land forces, which renewed the power of the Justices and Commissioners of the land-tax to impress such description of individuals for soldiers. Persons who had a right to vote for a member of Parliament, labourers during harvest, and known Papists, are, however, excepted; and this exception as to Roman Catholics continued in force for many years afterwards. The army is now solely recruited, as already observed, by voluntary enlistment for an unlimited period; and this mode of forming the army has given rise to many of the regulations found necessary to be issued by the military executive, in regard to this branch of the public service.

It seems rather surprising that, with a view to getting a better class of young men to enter the army, enlistment for a limited period, adopted for a time, was not persevered in. The power of leaving the army after a service of five, seven, or ten years, would probably in time have increased the number of young men of respectable character, who, with various views, might have enlisted for these limited periods. The hopelessness of advancement or release under the present system, must ever have the tendency to prevent any but the worst characters from entering a service which fixes their condition for life. " Necessity, not an ardent liking for the profession (observes Mr Marshall) compels many to enlist, they having lost their character, or contracted habits of idleness or improvidence, which more or less exclude them from the better paid walks of civil industry, by which means they are constrained to devote themselves to a military life." And the highest military authority in the country, the Duke of Wellington, states his opinion, that, under the present system of voluntary enlistment for an unlimited period, he does "not think that a better description of persons would be induced to enlist than at present, voluntarily, not even for any bounty, because the amount of the bounty is no consideration." In France, where the army is raised by conscription, voluntary enlistment is not encouraged; and "General Foy characterizes that class of the population who voluntarily enlist as the dregs of the people, whose constitutions are impaired, and whose morals are depraved, by the vices and excesses of large towns."

To the British army, as thus recruited, Mr Marshall's work solely applies. It is arranged under three principal heads, viz. 1. On the Enlisting of Soldiers; 2. On the Discharging of Soldiers; and 3. On the Pensioning of Soldiers. Under each of these heads he has collected much valuable information, which, besides being in itself curious and interesting to general readers, must form a valuable guide to those whose business it is to superintend the formation and support of the army.

1. *On the Enlisting of Soldiers.*—Each recruit on enlisting gets a nominal bounty of L. 3, of which L. 2, 10s. is reserved for his equipment, and he thus receives only 10s. in cash. The minimum age at which recruits are enlisted for regiments in India is twenty years; but for all other regiments, provided the individual have attained the minimum height, he is eligible, however young he may be. The minimum height for infantry regiments is usually 5 feet 5½ inches, or 5 feet 6 inches; for light cavalry, 5 feet 7 inches; and for heavy dragoons, 5 feet 8 inches. The mean height of the men of an infantry regiment is generally from 5 feet 7 inches to 5 feet 8 inches; of dragoons from 5 feet 9 inches to 5 feet 10 inches. The minimum height of soldiers in the French army is 5 feet 2 inches. "Within a certain range of stature (says Mr Marshall) men may be deemed equally efficient, but soldiers who are either much below the mean height, or much above it, are not so well fitted for all the duties of the army as men of a medium height."

To the physical qualities which are at present attended to in the selection of recruits for the army, Mr Marshall proposes to add the *weight* of the individual, as relative to his stature and age. That indefatigable statistical inquirer, M. Quetelet of Brussels, has ascertained the mean weight of males at different ages, and published the results; and he is of opinion that, when athletic men are required, recruits should not be approved who weigh much less than the average weight of persons at their ages. In the Netherlands the mean weight of males at

17 years of age is 116 lbs. 9 ounces, avoirdupois.
18 do. 127 9½ do.
20 do. 132 7⅓ do.
25 do. 138 12½ do.

The magnitude of the chest Mr Marshall also considers to be a good index of the physical power of the individual; and he advises that, in connection with the height, a minimum circumference of chest should also be adopted. On this qualification an interesting table is given, constructed by Dr Balfour, while acting as district Surgeon in London, from the measurement of 1439 recruits. From this table it appears that the average circumference of the chest in this number is about 32½ inches; the maximum 37 inches; and the minimum 28 inches; and Mr Marshall suggests, that no recruit should be approved whose chest does not measure 30 or 31 inches, even at the minimum height.

How far muscular power, or the power of undergoing continuous fatigue, may be dependent upon the weight of the individual and the circumference of his chest, would require to be established by experiments on large numbers. A certain weight and circumference of chest, if these always indicated corresponding muscular energy, would be a safe guide so far in selecting recruits for the army. Experiments relative to these points have been made to a certain extent by M. Quetelet, and Professor Forbes, which coincide in most particulars. According to Professor Forbes "the superior physical developement of natives of this country above the Belgians is very marked. In strength it is greatest, in height least."—"The English are the least developed of the natives of Britain at a given age, the Irish next, the Scotch retaining an intermediate place."

Under the head of "class of the population from which recruits are procured," a table is given, from which it appears, that, in the Dublin districts, about 64 per cent. of the recruits enlisted during a period of three years were husbandmen and labourers. Thus, in Ireland, it would seem that more than one-half of the recruits come from the agricultural class. Whether the proportion of agricultural labourers in Britain who enter the army as recruits approaches to any thing like this proportion, has not been ascertained; but the probability is otherwise. In Ireland the proportion of agricultural labourers to those employed in trades or manufactures of various kinds must greatly preponderate. Of the value of the two classes as soldiers, recruits from the agricultural class are held the most trustworthy. "Agricultural labourers generally enter the army in consequence of some family difficulty or discord;" while "recruits who are enlisted in the manufacturing districts are frequently idle and dissolute, and require all the means in the power of officers to correct the intemperate and vicious habits in which they have indulged." Mr Marshall mentions as an evidence of the operation of the improved condition of the people upon the recruiting of the army, that in one district, upon an average, about from one-fourth to one-third of the men who enlist pay the smart-money and all the other expenses which have been incurred on their account, rather than complete the enlistment by attestation before a magistrate.

The minimum age of recruits for the army is considered an important element in their selection. The arms, clothing, and necessaries carried by an infantry soldier, commonly amount to about 60 or 62 lbs.; and this weight on striplings of 18 years of age, and on continuous marches, is found to impair their general efficiency. Over-exertion produces disease; and the experience of the late war has demonstrated, that it requires the firmness of maturer growth to overcome the difficulties to which a soldier is subject on a march. "During the year 1805, a French army, which was cantoned in the neighbourhood of Boulogne, marched about 400 leagues to join the grand army in Moravia, before the battle of Austerlitz, which was fought on the 2d December. This object it effected without leaving almost any sick in the hospitals on the route. The men of this army had served two years, and were all above 22 years of age. Compare the above result with the march of another army under different circumstances. During the campaign of 1809, the troops cantoned in the north of Germany marched to Vienna, which is a much shorter distance than that which the other army travelled; but, by the time they arrived at the place of their destination, all the hospitals on the road were filled with sick."—Pp. 13, 14.

The essential qualities of a person fitted for the army are, according to Mr Marshall, a suitable age; a fitness for military duty: a healthy body; and a sound mind. The disabilities which disqualify for service are, 1. *Feeble constitution.* A good constitution implies a proportional developement and healthy condition of the bodily organs. Tall men are presumed to be more subject to disease than middle-sized persons. It is a singular fact stated by Mr Marshall, that of the children of soldiers, a very small proportion reach the age of manhood; and those who survive are commonly stunted in their growth, and often scrofulous. Of the mean annual number of conscripts for the French army, examined during the years 1831, 1832, and 1833, and amounting to 126,669, no less than 11,007 were exempted from service on account of feebleness of constitution, or nearly 9 per cent. Under this head are included not only all the varieties of unsound health, from obvious infirmities, but also obscure and periodic disabilities. 2. Weak or disordered intellect. 3. Chronic cutaneous affections. 4. Severe injuries of the bones of the head.

5. Impaired vision. 6. Deafness. 7. Loss of many teeth. 8. Impediment of speech. 9. Want of due capacity of the chest, and any other indication of pulmonic disease. 10. Impaired or inadequate efficiency of the superior extremities. 11. Unnatural excurvature or incurvature of the spine. 12. Hernia. 13. A varicose state of the veins of the scrotum or spermatic chord, &c. 14. Impaired or inadequate efficiency of one or both of the inferior extremities. 15. Ulcers, or unsound cicatrices of ulcers. 16. Traces of corporal punishment. 17. Diseases, whether acute or chronic, for which medical treatment is required. Under each of these heads Mr Marshall communicates much information that will be of essential use to medical officers in the British army in their duty of examining recruits. The corresponding disqualifications in the continental armies are also noticed. The remainder of this part of the work is taken up with the general directions for the examination of recruits; medical boards on ineligible recruits; form of returns; obscure and doubtful disabilities; and efficiency required for different branches of the service.

Of 6229 recruits inspected by Mr Marshall at the Recruiting Depôt, Dublin, from 25th December 1824 till 24th December 1825, there were 4839 approved and 1390 rejected. The per centage rejected was found to be, in town recruits 32.8, and of country recruits 10.3. In the following year, or from December 1825 to December 1826, 4018 were inspected, and of these 3243 were approved, and 775 rejected. Of 2347 town recruits inspected, 672 were rejected; and of 1671 country recruits, 202 were rejected; the per centage rejected of the town recruits being 28.6, and of the country recruits 6.1. The causes of rejection are likewise stated.

In a table showing the relative proportion of town and country recruits rejected at the head-quarters of the Dublin, Edinburgh, and London districts, for certain periods, from 1826 to 1837, "it appears that the range of the rejections of town recruits in Dublin extends from 28.6 to 71.7, being a difference of 43 per cent. and of the country recruits from 5.1 to 27.2, showing a difference of 22 per cent." Mr Marshall besides remarks, that "a considerable addition may be made to the ratio of rejections in each district, for the purpose of comprehending the recruits rejected on first inspections at dependent stations (country recruits,) consequently, it will appear that, in a number of districts from 40 to 60 per cent. or 1 out of two of the recruits for the army, are rejected upon medical examination."—P. 73.

The Second Part of Mr Marshall's work is "on the Discharging of Disabled Soldiers."—Before a soldier is permitted to leave his regiment, a regimental board investigates and records the individual's services, his disability, his character, his accounts and claims. The duty of medical officers in the discharging of soldiers has reference principally to the soldier's disability or unfitness for service. Soldiers being engaged to serve "until they shall be legally discharged," they have no claim as matter of right to be relieved from their engagement, after any period of service; and, indeed, as Mr Marshall remarks, "few men are discharged, except on account of incapacity for further service." This hopelessness of relief from an engagement contracted, perhaps, in a moment of thoughtless indifference, or disappointment, has given rise to a simulation of disqualifying diseases, for the purpose of procuring a discharge. Of the extent to which this is carried in the army, and the perseverance and success in feigning disease, which sets medical skill at defiance, we were not aware till we read this portion of Mr Marshall's work. The facts detailed with reference to simulated ailments are extremely curious, and the perseverance with which the appearances of disease are kept up, in many cases for years, is perfectly astonishing. Materials are here afforded to the moralist for a new chapter on the power of the mind over bodily sufferings, exemplified to an extent of which we had formed no previous conception. The existence of practices of this nature in the army to any extent, affords evidence that enlistment for life is not the best mode of supplying the demands of the service with a superior class of soldiers. Enlistment for periods of five, seven, or ten years, would, by putting it in the power of all who had formed a rash engagement, to terminate that engagement at the limited term, have a tendency to prevent such practices. Nor need any fear be entertained that the supply of trained and experienced soldiers would be thus diminished; for it is quite certain that a great portion of those who had been withdrawn from the pursuits of civil life for even the shortest of these periods, would voluntarily renew their engagements for the prospect of the pensions or rewards for length of service.

Nor is simulation of disease the only effect of that hopelessness of release, which the present mode of recruiting the army is calculated to produce. Instances are not wanting, and to a melancholy amount, where suicide terminates the scene.

> "Suicide, which is the highest degree of mutilation, is, I believe, more frequent among soldiers than among men of the same age and rank in civil life. The ratio of cases of self-murder among the cavalry branch of the service has been found to amount for a series of years to one suicide out of 20 deaths, or nearly one annually per 1000 of the strength. It is obvious that this statement does not comprehend the number of men who attempted suicide, but merely the cases where the result was fatal."—P. 141.

Mr Marshall's observations on the duty of a medical officer in recommending soldiers for discharge on account of disability to serve, are the result of much experience, and well deserve the serious attention of those who are called upon to decide in matters of this nature. His remarks on this head are important, and characterized by the same practical good sense which runs through the whole book. We give them in his own words. It is perhaps necessary to say, that simulators of disease in the army are technically called *malingerers.*

" Every medical officer who may have to propose or to recommend soldiers to be discharged on account of inefficiency, must be in a great measure guided by his own professional skill, discretion, and practical acquaintance with the duties of soldiers. He should invariably pay due regard to the claims of soldiers, while he devotes the requisite attention to the public interest. I most cordially agree with Dr Cheyne in the following passage of his letter to Dr Renny, (On the Feigned Diseases of Soldiers,)—' The wiles of soldiers in hospital will be with more certainty discovered by those who have an accurate knowledge of disease, obtained by clinical observation and pathological writings of authority, than by those possessing natural sagacity in the highest degree, if unassisted by a habit of carefully contemplating and studying disease.'

" Some diseases or disabilities, such as deafness or stammering, are much more easily feigned than others, and, consequently, the imposture is more difficult to detect. In all diseases of which the symptoms are obscure, periodic, or intermitting and uncertain, much care should be taken not to come to a wrong conclusion. ' Melancholy instances have come to my knowledge where men have died in making exertion above their strength, after having been looked on and treated as malingerers, and others, where slow decay and uncontrollable disease have carried them off.' (On some forms of Rheumatism prevailing in India, by Mr Malcolmson, Madras, 1835.) There are some real and not unimportant diseases, which are not indicated by a change of the pulse, or by any remarkable alteration of the colour or temperature of the body, or by any evident derangement of its functions. There are also other diseases which are capable of being simulated by the use of certain drugs, or by external applications. An intimate knowledge of the anatomy, physiology, and pathology of the human body, and of the effects of the articles of the Materia Medica, is therefore essentially requisite to prevent a medical officer from occasionally arriving at false conclusions in obscure cases.

" It is difficult for the simulator of a disease to give a consistent account of the origin and progress of his alleged infirmity. By a little management on the part of a medical officer, an imposter will commonly be led to enumerate incompatible symptoms, or greatly to exaggerate unimportant lesions; but it ought to be recollected, that patients suffering under real disease are apt sometimes to fall into a similar error. He is constantly prone to overact his part; and, if carefully watched, it will frequently appear that he is inventing symptoms, which is a much more difficult operation than simply and frankly to state his feelings. Two soldiers were transferred from a regiment in Ireland to the General Hospital, Dublin, for the purpose of being discharged, in consequence of alleged incurable disabilities. The designation of a disease was, as is usual in like circumstances, affixed to each name ; but the countenance and general appearance of the men indicated little, if any, derangement of the healthy functions of the body. The medical officer at the General Hospital made them stand up together, and requested one of them to give an account of his complaint, which he did very fully, being occasionally encouraged to enter minutely into a detail of symptoms and feelings. By his account, it appeared that he suffered more or less under disease from the crown of the head to the sole of the foot. Not a word of observation indicative of the incredulity of the medical officer was uttered in regard to the man's statement. The other man was then asked, 'What is the matter with you ?'—'*The same as this man*,' was his reply. The inference is obvious : he was evidently not prepared with a set of symptoms, and, without perceiving the trap laid for him, he instinctively availed himself of the ingenuity and talent of his fellow-imposter. They were sent back to the corps to which they belonged ; but I have no doubt that each of them succeeded in eventually '*working out*' a discharge.

"Harsh or arbitrary measures of any kind should never be adopted by a medical officer in doubtful cases of alleged disease ; neither should he be stigmatized in severe terms with the character of being a malingerer ; for, as Dr Cheyne observes, such a method, 'although it may sometimes intimidate a raw soldier, will only afford a stronger motive to the hardened knave for perseverance ; and if the opinion thus rashly pronounced should prove erroneous, the consequences may be very unhappy,—the confidence of the soldier in his surgeon will be destroyed, and the latter will be subjected to the just displeasure of his military superior.' Mild, firm, and in other respects judicious treatment, deprive a man of hope, which is perhaps the most effectual means of inducing a malingerer to return to his duty. Medical evidence in regard to the existence and disabling consequences of disease is in many cases merely presumptive ; and very rarely, indeed, does it amount to absolute certainty. Mistakes have happened—diseases, which were at first supposed to be feigned, have eventually proved genuine—and, consequently, however much appearances may be against an individual, it is prudent, and highly expedient, to proceed regularly, deliberately, and patiently, in every case. Medical officers are not warranted in employing any means which would be inapplicable to a genuine case of disease. This observation applies not only to coercive or penal measures, but even to irritating applications, nauseating medicines, and spare diet. Whenever there is any doubt, in regard to the existence or permanently disabling degree of an infirmity, the safe plan is to keep the man in hospital, for the purpose of prolonged professional treatment, and longer, if not more careful investigation. It may also be observed, that a man who has been in hospital for an alleged disability of a doubtful character, should invariably be afforded an opportunity of giving in (in other words, of apparently recovering,) without taking him much to task for his conduct ; or, in the language of the hospital, he should be let down softly. Unless when absolutely necessary, no suspected case should be transferred from a regimental hospital (where the man is known) to a general hospital. The reasons are so obvious as not to require a detailed illustration. Malingerers are more frequently instructed in the art of imposture in general hospitals, than detected and rendered useful soldiers; for there every new comer, if his natural disposition harmonizes with that kind of instruction, is corrupted by the information he receives in regard to the various modes of imposition.

"A disposition to malinger and to feign disease, is one of the most disqualifying disabilities with which a soldier can be afflicted. An old soldier who attempts to simulate a defect, and persists in his plan of imposition for a little time, is frequently lost to the service, notwithstanding the adoption of every means to bring him to a proper sense of his duty. Recruits and young soldiers are more frequently reclaimable. Old soldiers who prosecute their schemes with art—who possess great fortitude, and an inflexible resolution—will, I believe, commonly succeed in obtaining their discharge, either by making falsehood appear to be more probable than truth, or perhaps more frequently, by exhausting the patience of medical and commanding officers. It is only after some experience that a medical officer is aware of the difficulties he has to encounter in his endeavours to reform persevering malingerers. Let him be ever so assiduous, and adopt the most judicious measures for the recovery of simulators, who suffer under some real, although only trifling cause of inability, he will frequently find his measures rendered nugatory by their unwillingness to be restored to the ranks, and the pains they take to retard convalescence. He will also find himself much perplexed how to act, for the purpose of rectifying the mental aberration, or moral obliquity, of some schemers, whose disabilities are merely pretended. Imposters often display a spirit of invention, and an art in concealing fraud, which could not have been anticipated. The mind, by becoming concentrated on one object, appears to acquire new powers; so that persons with naturally weak intellects have evinced a tact and dexterity in the prosecution of a design far beyond what their general conduct would have warranted us in assuming. In coming to a conclusion with regard to the measures which should be adopted with a malingerer, commanding officers have frequently only the choice of two evils; to recommend his discharge, or to retain him in the service, with scarcely any prospect of his being a useful soldier. When an imposter is discharged, he almost invariably throws off the mask abruptly, and boasts of the success of his artifice, thereby giving a bad example to his comrades, and one which may be influential in exciting them to imitation. A malingerer if retained in the service is likewise liable to injure the morals and discipline of a corps. Many a simulator will hold out not only for several months, but for a number of years, probably passing his time chiefly in hospitals; and during all this period the contagion of bad example is in operation, by which influence individuals, who would have continued to be good soldiers, have been induced from the strict path of duty, and induced to feign disabilities, and to persist in schemes of fraud, with the most inflexible endurance.

"When a malingerer has, by mild and judicious measures, been induced to give in, I consider the circumstance of some importance to the service. Owing to the frequent intercourse which exists among soldiers, the event becomes often extensively known; hence, a useful warning is afforded, by which means individuals, who may be disposed to simulate disabilities, are deterred from making an attempt to do so. On the other hand, when a schemer succeeds, hope is excited, and his example may be extensively imitated. In a great many instances, I believe, the inmates of an hospital are aware when their comrades are malingering, although they very rarely, indeed almost never, give the medical officer a hint on the subject. An informer, when discovered, becomes an object of universal detestation; and hence one cause of the difficulty of accurately ascertaining the various methods of simulating disease. In all cases respecting which a medical officer finds some difficulty in making up his mind, patience and attention are strongly indicated; and when a soldier is presumed to be a persevering malingerer, it is in general bad policy to recommend him to be discharged, under the idea, that, as he is not likely to become useful in the ranks, the service would be benefited by getting rid of him; or to promote his views, by assigning, as a reason for discharging him, some possible or imaginary physical infirmity, when the real cause for wishing to discharge him is his unwillingness to do his duty. Similar reasons may be urged with regard to the propriety of exercising much care, not to send a malingerer home from a foreign station, such as India, on account of infirm health. The mere circumstance of a man having been so transferred at the recommendation of medical officers, is calculated to excite a presumption that he had suffered under some serious cause of disability, although no well-marked trace of any important disease may be recognised on his arrival in this country; and persons of the stamp alluded to never fail to adduce this fact in their favour most forcibly; indeed, they commonly seem to consider it alone as an incontestible proof that they ought to be discharged, either with or without a pension. This kind of evidence is sometimes difficult to set aside, although it certainly does not always produce conviction.

"Many a soldier is admitted on the sick list on account of some complaint which requires medical treatment, who, during the period of convalescence, becomes in love with the ease and comfort of the hospital establishment, and evinces no disposition to return to his duty. His first intention as a schemer may be merely to evade duty; but by degrees his views extend to an endeavour to get his discharge, and, if possible, with a pension, 'on account of disability contracted in the service.' Whenever a convalescent begins to think himself somewhat comfortable in hospital, he is in a fair way of becoming a malingerer. 'The least evil that can happen by soldiers remaining too long in hospital, is, that they will contract a slothful, lazy, idle habit, and turn, according to the military phrase, malingerers, that is, men who have lost all spirit to the service, and feign themselves sick when there is a prospect of action, or that they are to undergo any great hardship or fatigue, in order to be sent to the hospital; which life, through habit, becomes agreeable to them.' —(Bland's Military Discipline, 1727.)

" The simulation of infirmities for the purpose of being discharged from the service, is not confined to privates, or to morally vicious and irregularly conducted soldiers. Non-commissioned officers, and men of good character, occasionally feign disabilities, as well as young soldiers and alleged incorrigible offenders. Many well-conducted serjeants are extremely anxious to be discharged when they have completed twenty-one years service, more especially when they have some prospect of a suitable employment in civil life. Not long ago, a serjeant of the 62d Regiment, while it was quartered in Ireland, purchased a pistol, and hired a man to shoot him through the arm, probably hoping by this means to make it believed that he had been fired at by some person disaffected to the military, and that he would not only obtain his discharge but also a large pension. That well-conducted soldiers, whose names are not to be found in the defaulter's book, sometimes adopt improper means of obtaining their discharge, need not surprise us, when we consider the circumstances which usually impel young lads to enlist, and the interminable nature of their engagement. ' A soldier in the British army sees men in other situations, not always his betters, rising to wealth, and affluence, and distinction around him; he feels that he is stationary for life, that his prospects cannot mend,' and that every attendant misery of poverty awaits him when his health and strength is exhausted. Need we wonder, therefore, that men so situated should frequently suffer under depression of spirits, and consequently of impaired health, (home sickness,) and that they should sometimes adopt improper means of obtaining their liberty. Hope is as essential a requisite for promoting good conduct as it is for attaining happiness. Tytler, in his Essay on Military Law, says, ' If a soldier complains of the restraints of his vocation, he throws no impeachment on his profession, but arraigns himself of folly, who did not perceive that these restraints are essential to its condition.' This opinion is no doubt theoretically true; but the thraldom imposed by folly is not less galling than the bondage occasioned by misery or congenital servitude.

" *2dly, Does the disability in question render a man unfit for military duty?*—This point frequently requires much consideration, and every case will demand special investigation. The conclusion in regard to each man must be decided by professional knowledge, and practical experience of the duties of soldiers, of their habits, their hopes, their wishes, and modes of thinking. There are many degrees of loss of vision, varicose veins, hernia, rheumatic pains, lameness from old fractures, mutilations, &c. which do not disqualify a soldier for performing his duty, and which will be little heard of by a medical officer, provided a soldier wishes to serve, and has an object to gain by doing so. But if an old soldier, wo suffers under any disability, although in no very great degree, wishes to obtain his discharge, he has only to complain, and to persevere by ' lying in' (becoming a patient in hospital,) regularly a few weeks before the periodical inspections, and eventually he will attain his object. The constitution of an infantry soldier may be good, and his health tolerably sound; but if he has served twenty-one or twenty-two years, and is above 40 years of age, his strength has in some measure passed away, by which means he is not able for the active duties of the service. There are no invalid or garrison battalions in the British army, to which partially inefficient men might be transferred; and consequently it will be necessary to discharge them, as being more or less unfit for military duty.

"3dly, *Is the disease or disability incurable, and will it permanently unfit a man for military duty?*—This is a question which in some cases requires much discretion and consideration. Few diseases can be called absolutely incurable. Those which consist in impaired action or disordered function of some organ of the body, are considered incurable, when the morbid process is unsusceptible of being modified by any treatment or remedy; when human interference appears to be unavailing; and when remedies have been employed and persevered in, until, in all probability, permanent recovery, so as to render a man fit for performing the duty of a soldier, cannot be expected. In some diseases, more especially in such anomalous disabilities as wandering pains, a considerable time should elapse before recovery be deemed hopeless. A great majority of the patients received into military hospitals are admitted during a period of life when the vital actions are energetic, by which means recoveries are rapid; and medical officers are on that account apt to think that a patient whose disease is unusually protracted suffers under an incurable malady. They have not always sufficient confidence in the curative influence of a youthful constitution and an adequate period of time. Many men recover rapidly after they have been discharged,—much more rapidly than was anticipated while they were soldiers.

"I shall conclude these observations by warning young medical officers against employing harsh or violent language, or adopting unprofessional or coercive measures towards soldiers. Intemperate language will not intimidate a veteran malingerer, or induce him to return to his duty, and coercive treatment, which is not required by the nature of a case, is decidedly illegal. In 1822, a staff surgeon was arraigned before a court-martial for using opprobrious and disgraceful words towards soldiers whom he suspected of being malingerers. He was acquitted of all the charges, five in number; but not without much trouble and anxiety. I allude here to the circumstance, as it may prove a useful warning to young medical officers, and it is for that purpose I have done so."—Pp. 89-97.

Mr Marshall classes the disabling infirmities of soldiers under ten separate heads, and the circumstances which distinguish real from feigned diseases are pointed out under each head.

The first class is "Diseases of the Eyes—total or partial loss of Vision." During the year 1818, 477 men were discharged and pensioned on account of partial or total loss of sight; but for a period of five years, from 1823 to 1828, the numbers discharged and pensioned were 867; viz. 90 on account of total blindness, 300 in consequence of the loss of one eye each, and 477 from impaired vision of both eyes." A pension for life being granted by Government for this remediless calamity, was the means of increasing the number of claimants; and to qualify them for discharge and pension, it was proved, says Mr Marshall, before a Committee of the House of Commons, that in a barrack where several hundred cases of inflammation of the eyes occurred, a large proportion of the cases were artificially excited. A passage quoted from a letter of Dr Cheyne, gives a melancholy view of the perversion of reason which induced men thus to deprive themselves of the blessing of sight: "Inflammation artificially excited, (says he) is most painful, and is kept up under every privation which can make life miserable;—locked up in a dark ward, and permitted to have intercourse only with the officers of the hospital, nurses, and orderlies, confined to diet which, from the absence of every stimulating material, is most disrelishing; suffering under painful external applications and nauseating internal medicines, phlebotomised and leeched till their complexions are bloodless, their pulse hemorrhagic, and the frightful train of nervous symptoms which excessive blood-letting produces, is established in the system. All these evils, in many cases, have no effect, but to confirm the soldier in his determination to destroy one or both of his eyes, that he may be dismissed from the service with the chance of a small pension."—Pp. 100, 101.

Class II. *Deafness.*—During the year 1818, there were 36 men discharged from the army, and placed on the pension list in consequence of alleged deafness. But as deafness may exist without any obvious trace of disease, the difficulty of discovering real from feigned deafness is extremely difficult. Mr Marshall gives some curious cases illustrative of simulated deafness.

"A trooper, named M'Keon, who belonged to the 7th Dragoon Guards, then quartered at Piershill Barracks, appeared one morning to be both deaf and dumb; a disability which did not exist the previous evening. Many means were adopted to ascertain that he possessed the sense of hearing, but without success. Firing a pistol close to his ear produced no effect. After keeping him a long time in the regimental hospital, he was sent to the Edinburgh Infirmary, from which he was subsequently discharged as incurable. No noise, however sudden, or artfully employed, succeeded in rousing his attention. Eventually it was believed that the alleged disability was real, and his situation excited the pity and commiseration of the officers of the corps. At the end of about a year he was recommended to be discharged, and left Dundalk, where the regiment was at that time quartered, on his way to Dublin to pass the invaliding board. During the first day's march he got intoxicated, and at the same time recovered the use of his tongue and ears. His escort brought him back to the regiment next day, but before he arrived his deaf-dumbness had returned. He was tried by a court-martial, and sentenced to receive 800 lashes; but as he still held out, it was deemed advisable to send him to the General Hospital in Dublin, for the purpose of being examined by the medical officers of that establishment, before the sentence of the court-martial should be carried into effect. Here various attempts were made to induce him to give in, and, among other means used for that purpose, he was informed that, if he returned to his duty, the sentence of corporal punishment would be remitted; a promise which produced no immediate consequences. Upon admission into hospital, he was for some time accommodated in a ward in company with several other patients, but he was afterwards confined in a solitary cell, with no other sustenance but a small allowance of bread and water. The orderly who attended M'Keon was instructed to give him his scanty fare; but on no account to speak to him. In this manner things went on for nearly three months, when one morning the pretended deaf-mute accosted the orderly by saying, 'Good morning to you, James.' James was completely astounded for some time; he soon, however, so far regained his self-possession as to secure the door, and to make all haste to inform the steward of the hospital of what had taken place. When M'Keon was interrogated in regard to the recovery of the faculties of hearing and speaking, he stated that he had had a dream, and that when he awoke he found that the long lost functions had returned. He was not punished, he returned to his duty, and conducted himself with great correctness for a considerable time, but eventually he deserted, taking with him his arms, accoutrements, &c. M'Keon must have been desperately disgusted with the service, or possessed an ardent love of liberty to enable him to endure the restraint, the privations, and the deferred hope to which he was so long exposed."—Pp. 106, 107.

The third class of disabilities includes "Diseases of the Organs of Respiration and Circulation;"—and the fourth class "Diseased or Impaired Functions of the Organs of Digestion." Instances of simulation in both these classes are given,—particularly of liver-complaint and hernia.

The fifth class of diseases which imply disability, are "Diseases and Lesions of the Genito-urinary Organs;" and the sixth class are "Diseases and Lesions of the Skin and Cellular Membrane." Of this last class are ulcers; and the annual average of men discharged from the service on account of ulcers and varices exceed 100. Disabilities of this nature, Mr Marshall observes, require to be carefully investigated; for the practice of exciting ulcers by means of corrosive or irritant substances prevailed to a considerable extent in the army during the late war.

The seventh class, or "Diseases and Impaired Function of the Organs of Locomotion," as causes of disability, has, as was to be expected, incited many to counterfeit their symptoms. Under the head of rheumatism many soldiers are annually discharged; and Mr Marshall remarks, that "perhaps there is no class of disabilities which requires more care and more caution on the part of medical officers than cases of alleged pain, rheumatism, lumbago, &c. in men of comparatively short service. The most experienced eye, the soundest judgment, and the most delicate tact, may be deceived." He adds, that "in no case should means be adopted to induce a suspected malingerer to give in, which a medical officer would regret having employed, were the disability to prove real." The fortitude and perseverance of some counterfeits is astonishing. Dr Cheyne relates the case of a man who for four months kept his body bent nearly double; but, being tried by a court-martial, and convicted of malingering, received 150 lashes out of 300 without flinching, obstinately declaring his inability to stand erect. On being afterwards ordered out to receive the remainder of the punishment, he gave in, and became a good soldier. Under the head of crooked back Mr Marshall relates a still more extraordinary case.

"A man, named Fitzgerald, belonging to the second battalion Royal Regiment, while serving in India, alleged that, in consequence of an injury on his loins, he was unable to stand upright. For a period of eighteen months he walked with his body bent forward in such a manner as that his fingers nearly touched the ground. Neither medical nor moral means had any influence in restoring him to the ranks. He held out until a communication was received from the Horse Guards, authorizing Commanding Officers to re-enlist men whose period of service had expired, and that, when approved, they were to receive a bounty of sixteen guineas. This was the case with Fitzgerald; and two days after the arrival of the communication had been announced, he presented himself for inspection as straight as a well drilled soldier before the medical officer under whose care he had long been. Moral turpitude, not physical disability, prevented his being re-enlisted into the Royal Regiment; but he eventually enlisted in the 25th Regiment of Dragoons, which was at that time in India."—P. 135.

Deformity of the spine, wry-neck, immobility of the shoulder-joint, and contraction of the elbow-joint, knee-joint, and fingers, have all been counterfeited with more or less success; and even mutilation of a necessary member has been resorted to in order to procure a discharge. Mr Marshall relates that he belonged to a regiment in which "nine men maimed themselves in the course of six weeks, and in every instance the injury was presumed to have been inflicted voluntarily. The explosion of their own muskets was the plan they invariably adopted to effect their purpose; and the injury was always in a foot or hand."

The eighth class of disabilities, consists of "Diseases and Lesions of the Lymphatic System, and of the Constitution generally;" and the ninth class of "Diseases and Lesions of the Nervous System." Of this last class palsy is easily and frequently simulated,

as well as hemiplegia and paraplegia occasionally. Many curious cases of counterfeit disease are detailed by Mr Marshall. The following is one of simulated paraplegia.

"A man belonging to the 10th Regiment, while it was serving in the Mediterranean, asserted that he had lost the power of his inferior extremities, and underwent hospital discipline for two years, at the end of which period the existence of any real disability was still doubted. As a final trial, the medical officer directed him to be confined in a room, containing a shelf amply stored with provisions, which he could easily reach by standing on his legs, but not otherwise. The food remained untouched at the end of forty-eight hours, and, as it was not deemed advisable to prolong the experiment, he was included in the list of invalids, and carried on board a transport bound for England. Before the ship sailed an alarm was given about midnight that she was on fire; every one on board hurried into a boat alongside, and after reaching the quay the passengers were mustered, when it was found that the alleged paralytic cripple had not only succeeded in saving himself, but he had brought his trunk also on shore with him. He was sent back to the ranks." —Pp. 152, 153.

Mental alienation and weakness of intellect disqualify for the army. Insanity has been frequently feigned by soldiers to procure their discharge from the service, and some have succeeded in this species of imposition. "But it is also true, (Mr Marshall observes,) and the fact is a melancholy one, that real insanity has been mistaken for feigned, and the patients treated and punished as imposters." A few cases under this head are given for the purpose of drawing the attention of medical officers in the army, to the important department of mental alienation, and the means of recognizing it when submitted to their observation.

The last class of disabilities are what Mr Marshall entitles "Moral Disabilities." Of these, he is of opinion, that "there is no class of disabilities which requires to be more carefully considered than moral infirmities, as many a crime has been perpetrated by soldiers for the avowed purpose of being brought before a court-martial, and ultimately discharged." And Sir Henry Hardinge, in his evidence before the Commission on military punishments, points out the consequences which may result from discharging soldiers on account of moral disabilities. "If you give the commanding officer the power of getting rid of bad men, because they are bad, you will offer a premium for misconduct, and would make a greater number of men bad for the purpose of gaining their discharges." To this part are appended two tables on the Statistics of Hernia.

The third great division of Mr Marshall's work is on the Pensioning of Soldiers. But as this portion of the book has less reference to medical than to military facts, we must refer to the work itself for the very valuable information collected on this point.

To medical officers in all the branches of the public service, Mr Marshall's work is indispensable, as containing, besides the results of his own experience, all the collateral information to be derived from the practice followed in foreign countries in selecting their military force. The number of curious cases of simulated disease which illustrate the different heads, renders it extremely interesting, and a performance equally deserving the attention of military as of medical officers.

Art. IV.—*Outlines of Human Physiology*. By Herbert Mayo, F. R. S., Senior Surgeon of the Middlesex Hospital, &c. &c. 4th Edition. London, 1837. Pp. 534.

In the forty-second volume of this Journal will be found a notice of the third edition of Mr Mayo's work, and the fact of a fourth edition being so soon called for, speaks strongly in favour of the acceptableness of his labours. The author has been at much pains to improve the present edition by adding the recent discoveries in physiology, and increasing and rectifying the information communicated, which he has done with his usual ability and discretion. He still refuses to acknowledge the priority of the researches of Bellingeri on the physiology of the fifth and seventh pairs of nerves; but as this subject was so fully entered upon when noticing the Dissertation of Bellingeri, and also the last edition of the work of Mr Mayo, we content ourselves with referring to what is there stated.

The principal additions to the present volume consist of a very full notice of the discoveries of Mr Kiernan on the minute anatomy of the liver; and of the researches of M. Breschet on the structure of the skin. Under this head we find Mr Mayo gives a new explanation of the cause of the mortality in the Black Hole of Calcutta, which he adduces as an instance of death "from the accumulation of heat in the system." He says, "this great mortality appears to have ensued in consequence of the hot and confined air becoming saturated with moisture, which prevented further evaporation from the skin, and kept the heat of the body permanently raised above the usual standard." (P. 166.) Mr Mayo seems to forget that a similar accident happened in London in 1742; and twice, at least, in the lead mines at Lead Hills; in all which cases death could be traced to have been caused by the vitiated and irrespirable air, but not by "the accumulation of heat in the system;" and it may be remarked, that the symptoms observed in these last cases were very similar to those recorded as having occurred amongst the sufferers in the Black Hole of Calcutta.

The author has also subjoined some additional observations on the anatomy of the brain, and the relation which its size and form bears to the mental developement. He speaks as if it were matter of uncertainty whether the chimpansé and pongo approach more nearly to the human species than the inferior animals. The dissections of modern anatomists are generally considered to have put this matter beyond a doubt; nay, naturalists, from the external structure of these animals alone, have shown that they approach more nearly to the human form than any other known animals.

The author doubts the justness of the opinion, that the cerebellum influences the sexual appetite, and this because "quadrupeds use the organs of smell and vision for discriminating the objects of their appetites both of food and desire;" and because neither the olfactory nor optic nerves communicate with the *cerebellum*, it is more likely that this appetite is connected with the *cerebrum* than with the *cerebellum*. The strongest evidence in favour of the cerebellic influence is found in those numerous recorded cases of cerebellic disease or injury, in which the morbid excitement or complete loss of this appetite, was, on dissection, traced to the particular form of disease which had affected the cerebellum. At the same time it must be admitted that the subject requires most careful revision.

He has much improved that portion of his work treating of dreams, somnambulism, and spectral illusions,—a part which was rather defective in the former edition; and he has quoted several interesting illustrative cases from the works of Dr Abercrombie, Dr Hibbert, and others.

He has also enlarged somewhat on the organs of the senses; but in treating of vision he has apparently overlooked the researches of Dr Alison.*

Mr Mayo finds no difficulty in understanding how objects appear erect, though depicted inverted on the retina; "for (says he) the upper part of the retina is that which alone, by the law of vision above-stated, can see downwards; or, to speak with more precision, that can have sensations of colour excited in it, the apparent direction of which is downwards." (P. 276.) The "law of vision" may require this, but still it by no means explains how an erect image is conveyed to the mind. Mr Mayo in like manner meets with no greater difficulty in explaining single vision with two eyes. He deems it unnecessary to admit that there are corresponding points in either retina. "It seems unnecessary (says he) to resort to this explanation of the fact. It has been already shown that objects are seen in a definite direction; when; therefore, it happens that the visual direction of an object is the same, or nearly the same for both eyes, that object appears single; when different the object appears double. In both cases two objects are seen; but in single vision they are seen in the same place, and therefore necessarily appear to form but one; the images coincide, and are, therefore, essentially indistinguishable."—P. 283.

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* Transactions of the Royal Society of Edinburgh, Vol. xiii. pp. 472, 493.

With regard to single vision with two eyes, Dr Alison explains the fact from the crossing of the fibres at the optic commissure; which he considers as still further corroborated by the circumstance of this decussation being only observed in those animals which use both eyes at once, or are capable of directing both eyes to the same object. But the inversion of the image being converged erect to the sensorium is the most interesting part of the paper, and to which the attention deserves to be more particularly directed.

Dr Alison shows from minute anatomical investigation that the lower fibres of the retina, or expanded optic nerve, can be traced back to the upper surface of the cerebral mass from which these fibres originate; that the upper fibres of the retina are lowest at their origin from the brain;—in fact, that, as the fibres of the optic nerve proceed onwards to the retina, they are as it were twisted one-half round, like the strands of a rope, so that though an object be depicted inverted on the retina, the impression conveyed to the sensorium is actually erect. We quote Dr Alison's own words with regard to this anatomical peculiarity: "When we trace the course of these fibres, (of the *Tractus optici*,) in the brains of the Mammalia, whether they descend on the *corpora quadrigemina* from the *thalami*, or pass more directly backwards below the *corpora geniculata*, it seems to me quite obvious that they first turn inwards, and then enter the *corpora quadrigemina* from above downwards, and are so expanded over the superior of these bodies (the *nates*) that the outer portions of the tractus pass over to the inner part of the nates, and the upper portions of the tractus pass down to the lower part of the nates."—Trans. R. Soc. Ed. p. 486.

The chapter on Voluntary Motion has been remodelled, and considerably improved in arrangement and in matter.

Mr Mayo gives a minute and elaborate account of the connection between the fœtal and maternal portions of the placenta; and, from the examination of the specimens of this organ in the Hunterian Museum, revives the doctrine taught by Dr William Hunter, that it is composed of a "series of cells which are percolated by the blood that flows into them from the uterine arteries, and finds issue by the uterine veins." The fœtal vessels, on the other hand, dividing into capillary tubes, ramify over these cells.

In an appendix, Mr Mayo gives an analysis of the experiments of Dr Addison and Mr Morgan on the absorption of poisons; the results of Dr Beaumont's inspection of the stomach in the case of St Martin; the observations of Weber on the sense of touch; and also Professor Ehrenberg's discovery of the tubular structure of the brain and nerves.

In conclusion, we have great pleasure in recommending this volume, as presenting an instructive and interesting view of physiological science.

ART. V.—*On Long-continued Contraction of the Lower Extremities from an affection of the Spine.* By R. A. STAFFORD, Esq. Surgeon to the St Mary-Le-Bone Infirmary. 8vo, pp. 26.

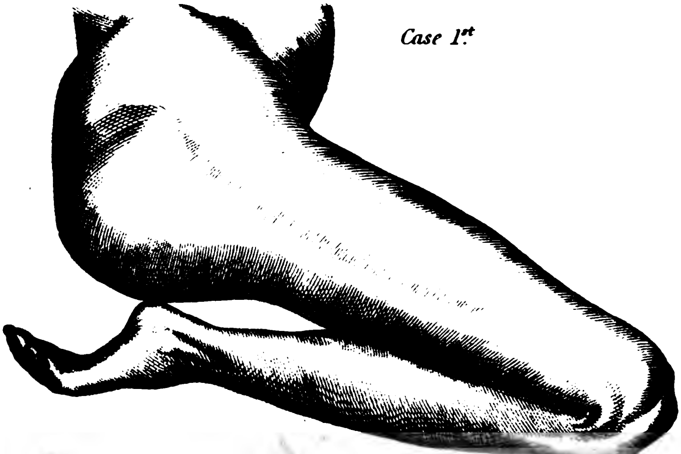
IN this tract Mr Stafford gives a particular account of a peculiar rigid, contracted, or inflected condition of the lower extremities, which has been long known to take place in certain stages and forms of spinal disease, and which is more or less familiar to those who have paid much attention to the different stages and forms of spinal disease.

The kind of contraction of which Mr Stafford treats consists in the members being involuntarily and irresistibly inflected on each other by the gradual involuntary and spastic action of the flexor muscles, while the extensors possess no power of again extending them or opposing and withstanding this forcible contraction of the flexor muscles. Thus, the thigh may be inflected on the belly to a greater or less extent; the leg is inflected backward on the thigh, with complete stiffness of the knee-joint; and in some instances the latter inflection is so considerable that the calf of the leg rests on the back part of the thigh; and the heel presses closely on the *nates*, the foot being turned backwards as represented in the engraving, (Fig. 1.) In order to illustrate the nature of this kind of lesion of the locomotive organs, Mr Stafford details the circumstances of five cases, of four of which we give short abstracts.

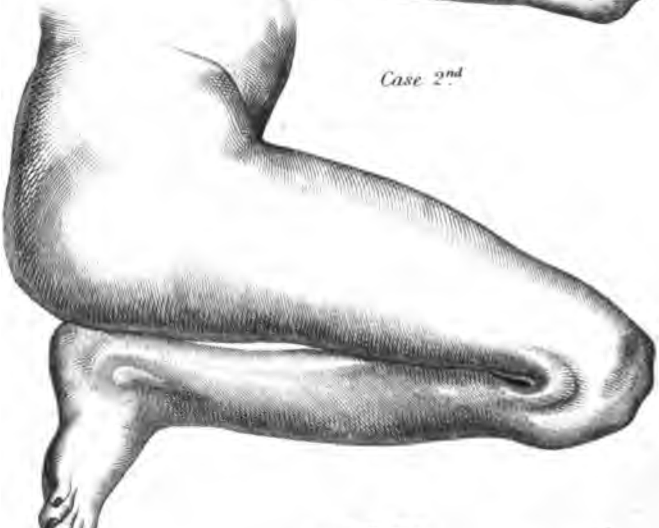
CASE I.—Mary Kean, aged 30, a slightly made girl, of small stature, was admitted in January 1833, into the St Mary-Le-Bone Infirmary, with complete contraction of the right lower extremity, and contraction of the third and little finger of the hand of the same side. She possessed the faculty of feeling in both limbs. But the knee-joint was firmly bent and stiff; the calf of the leg rested on the back part of the thigh; and the heel was closely pressed on the nates, the foot being turned backwards, as represented in the engraving, Fig. 1. She stated that she had been subject to epileptic fits since infancy; that about two years previous to admission she was attacked with violent pain in the lumbar region, pain in the hip and knee, and acute pain along the course of the ischiatic nerve, with considerable tenderness and increased sensibility of the whole limb. At this period the right lower extremity became gradually but firmly contracted, and the contraction could be by no means prevented. Shortly after the two last fingers of the right hand also became contracted and inflected into the palm of the hand, so as to lie across the index and middle-finger of the same hand. She was admitted into one of the London hospitals, where the symptoms underwent some mitigation, but the limbs remained in the same state.

Edin^r Med. & Surg. Jour. Plate IV. Vol. LII.

M^r STAFFORD'S CASES AND INSTRUMENT.



Case 1st



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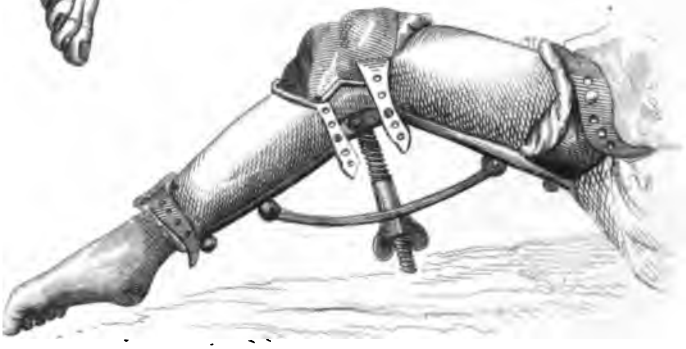

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For the two years previous to 1833 she continued pretty well, but at the time of admission in the St Mary-Le-Bone Infirmary, she was suffering from her original symptoms. The pain in the back, hip, and knee, was very acute; and the tenderness and sensibility of the whole limb were so great that she screamed at the slightest touch, and she could not bear the weight of the bed-clothes. The course of the ischiatic nerve was very painful and tender. Her pulse was quick, the tongue furred, the skin hot and dry, and the thirst great. The nights were restless and sleepless.

These symptoms continued in different degrees of intensity for three or four months. The treatment consisted of local depletion by cupping and leeches over the lumbar region, and along the course of the ischiatic nerve; the exhibition of antimonials, opiates, and aperients; and afterwards the employment of counter-irritants by blisters, tartar emetic ointment, and issues on each side of the spine in the lumbar region.

When the inflammatory symptoms had entirely subsided, the pain in the back had ceased, and the tenderness in the limb was abated, an attempt was made to unbend the contraction and restore the limb to its natural state. This purpose was attempted to be accomplished at first by introducing small thin cushions between the calf of the leg and the back part of the thigh, drawing them as near as possible to the flexure of the joint. At first this procedure caused extreme pain and severe attacks of epilepsy. By degrees, however, the patient became able to bear the treatment. Thicker cushions were then employed, causing as formerly great pain, but which subsided as the limb became habituated to their use.

When the cushions had been employed between six weeks and two months, the contraction had been so far relaxed as to allow the introduction between the leg and thigh, of a machine so contrived, that, by turning a screw, the leg can be gradually extended. This machine, which is seen applied in Fig. 3, consists of two splints joined by a hinge at the bend of the knee-joint, one resting on the back part of the thigh, the other on the calf of the leg; a bow made of iron, the extremities of which rest on each splint, and through the centre of which passes a screw, which is also attached to the angle at the junction of the splints. A nut, as it is named, is turned on the screw, and presses on the centre of the bow; consequently when the centre is pressed on by the working of the screw, the two extremities extend the splints, and tend to overcome the contraction.

By means of this machine the limb was gradually extended inch by inch, till the leg and thigh were as straight as natural. During the progress of extension friction was employed, and the knee was exposed to steam. The limb was then exercised; and at the end of seventeen months from the beginning to the termination of the treatment, the patient was dismissed from the hospital cured. The fingers were likewise gradually extended and restored to their natural use and position.

That the spine was the seat of disease in this case, Mr Stafford infers is shown by the symptoms; viz. the acute pain in the back, the pain and tenderness in the ischiatic nerve, the pain in the hip and knee, the extreme sensibility of the whole limb, and lastly, the firm contraction of the leg; all of these symptoms denoting some affection of the spinal marrow. He further thinks it probable, that the portion of the chord or *cauda equina*, whence the right ischiatic nerve issues, was either inflamed, or in a morbid condition, and thus produced the painful affection and contraction of the limb. The contraction of the ring and little-finger of the same side, he conceives, shows that the origin of the ulnar nerve was similarly affected.

Arguments to the same effect he deduces from the method of treatment; and he adds, that, however firm these contractions may appear to be, yet, by perseverance and care, after the removal of symptoms of inflammation, and subsequently, by the gradual employment of extension, the limb may be restored to its proper position and healthy action.

Case II.—Ellen Sullivan, aged 25, a stout plethoric young woman, of strumous habit, fell on the right knee and injured it. She was admitted into the St Mary le Bone Infirmary, under Mr Stafford's care, in February 1835, with symptoms of inflammation of the synovial membrane, and considerable enlargement of the joint from the effusion of synovia. Blood was frequently drawn from the knee by cupping and leeches; counter-irritants were applied; and in the course of from six weeks to two months, the joint was so far restored, that she was about to be dismissed from the hospital. The day before that fixed for her departure, she was again attacked with excruciating pain in the knee, accompanied with pain in the back, in the lumbar region. Blood was drawn from the knee; fomentations were applied, and aperients were administered. On the following morning the pain was almost insupportable, and though a splint was placed under the knee to prevent it, yet contraction commenced. Pain in the back continued with tenderness along the whole side, from the lumbar region down the ischiatic nerve to the foot, and the pain of the knee was so intense, as to preclude sleep or any rest. The pulse varied from 120 to 130; the tongue was furred; the face flushed, and the countenance expressive of extreme pain. Blood was drawn largely from the loins by cupping, and from the course of the sciatic nerve and the knee by leeches; fomentations were applied; and purgatives alternated with opiates were administered. Under the use of these means the symptoms were relieved, but recurred; but the leg gradually, and even rapidly, contracted on the thigh, notwithstanding all means used to prevent it. The calf at length rested on the inside of the thigh and the heel on the nates. The knee was little swelled, but the skin was tense, shining, and scarlet-coloured. (See Fig. 2.)

At the end of three months, the acute symptoms gradually abated. Counter-irritants were then employed on each side of the spine in the lumbar region, along the course of the sciatic nerve, and on the knee-joint, alternated with local bleeding from the loins and other affected parts, and these seem to have been the only efficient remedies; for though iron, iodine, veratria, morphia, quinine, hydrocyanic acid, solution of arsenic, the mineral acids, and tonics of every kind were employed during the space of between two and three months more, they were followed by little or no amendment. At length, at the end of eighteen months, during which the chief means consisted in local depletion and counter-irritation, the acute symptoms subsided, and the pain in the back and that in knee and limb abated, leaving only the contraction of the leg. To overcome this, the cushions began to be employed, and afterwards the machine for extension was applied; and under the steady employment of this, with friction, steaming, and exercise, the patient was enabled to use it with perfect freedom.

This case the author regards as quite similar to that last mentioned, but differing merely in the circumstance, that the knee was first affected, and that the spine was implicated secondarily.

There is, however, it must be observed, a little difficulty in admitting the spine, or rather the spinal chord and its coverings, to be so decidedly affected as in the last case. It is quite common for the leg to become contracted on the thigh, after much inflammation in the articular apparatus of the knee-joint; and all this contraction might have taken place entirely independent of any disease in the spinal chord or its envelopes. With regard to the symptoms of pain in the back and along the course of the sciatic nerve, these sensations might have been produced by the reflected sympathetic irritation, which often takes place from diseased textures, backward, along the course of the nerves distributed to them, to the central connections of these nerves. In this case, the irritation of inflammation in the synovial membrane and capsule might have been propagated backwards along the course of the sciatic nerve to its spinal or central connections.

Case III.—A young lady of 18 presented the usual symptoms of inflammatory disease of the spinal chord and its envelopes, causing spasms and contractions in the lower extremities, until they were reduced to a semiflexed position. Remedies, chiefly depletion and counter-irritation, were used at first with good effects, so as at the end of twelve months to restore some degree of sensation and motion in the limbs. But afterwards, the friends of the patient, wearied with the tediousness of the case, employed friction, and attempted to exercise the limbs. The spasms returned; coma came on, and death followed. There was no examination. It was ascertained, however, that there was angular curvature of the spine, beginning at the fourth dorsal vertebra, and disease implicating five or six of the vertebræ below this.

Case IV.—In this case, a young man of 15, who was in January 1837 in St Mary le Bone Infirmary, presented angular curvature of the spine, beginning at the fifth dorsal vertebra, and ending at the tenth. About three years previously, when stooping, a young man leaped on his back and knocked him down; and from that time he complained of pain in the back, and the curvature began to take place. About twelve months after, the lower extremities became contracted in the course of a single week, and drawn up in a semiflexed position, so that the heels were within four inches of the nates, and in that position they remained. At the period of admission into the infirmary, they could be straightened to a certain extent, but they were immediately retracted, as if by the agency of a strong spring.

The treatment in this case consisted of local depletion from the spine, and the employment of counter-irritants. At length the contraction subsided; the limbs allowed themselves to be straightened; and in July 1838, the boy was able to walk like other people.

The cases of which we have given the present abstract are, in several respects, both pathological and therapeutic, important. Mr Stafford, however, is mistaken in supposing, as he seems to do, that it is a new fact, that spasmodic or involuntary contraction of the extremities is an effect of disease of the spine; and he fails to present, we beg to submit, the pathology of this disorder of the muscular system in a correct point of view. It has been long observed in young children and infants, that the fingers and toes were liable to be contracted spasmodically and involuntarily into the palms of the hands and the soles of the feet. It is also well known, that in cases of hemiplegia which recover, the leg of the affected side always presents more or less of this involuntary spasmodic contraction. It is known also that, in the incipient stage of spinal disease, this species of contraction takes place before *paraplegia* is complete, and is always observed to precede paraplegia in cases in which the approach of the disease is gradual, and rather slow. In proof of this we have merely to refer to the observations of Dr Kellie on the spasmodic affection of the thumbs and toes in infants, (Ed. Med. and Surg. Journal, Vol. xii. p. 448,) our account of the researches of Bellingeri, (Ed. Med. and Surg. Journ. Vol. xlii. and xliii.); to the history of the case of Dominico Valetta, given by Dr Peebles; and to the work of Ollivier, who describes a number of cases in which this involuntary spastic contraction and rigidity took place. This symptom, indeed, is of the same nature with the spastic rigidity observed to take place in many cases of inflammatory or hemorrhagic softening of the brain or spinal chord, and in which it generally is the precursor of palsy, and sometimes it is an accompaniment.

The main point is to determine, if possible, the pathological state of the brain or spinal chord, on which the spastic rigidity of the flexor muscles depends; and to ascertain why it takes place in one class of cases and not in all. This question has occurred to Mr Stafford; and he has in the beginning of his paper undertaken to consider it. But while we must admit that he has shown a good deal of ingenuity in enumerating the various circumstances in different diseases calculated to elucidate the nature and origin of the spastic contraction, we must add that he involves himself in some confusion, by attempting the enumeration of the causes of the state, before he had sufficiently illustrated its phenomena by the history of cases.

Thus Mr Stafford observes in his general views, that, as the *medulla spinalis* gives the power of feeling in the trunk and limbs, therefore if feeling be lost, it must arise from some affection of the chord; secondly, that as it governs motion, if motion be lost, it has suffered some functional derangement or morbid alteration in structure; thirdly, that if contraction of the limbs take place, as the chord governs the action of the muscles, therefore most probably the affected part is the spine; fourthly, that if there be increased sensibility of a limb, that is produced by some morbid state or inflammation of the nerve itself, or of that part of the spinal chord governing sensation, whence it issues; and fifthly, when contraction and spasm ensue, there can be little doubt that they are produced by inflammation of that part of the substance of the chord which governs motion, or at the origin of the nerve which supplies the muscles of the affected part. Now Mr Stafford does not here afford any explanation of the peculiar character of the symptom which forms the subject of his paper, or the circumstances under which it takes place; viz. why it should not be complete loss of motion, but merely spasmodic and involuntary contraction, and that contraction confined to the action of the flexor muscles. The third observation presents an inconclusive deduction, or what is vulgarly called a *non sequitur;* in so far as it does not explain why motion is not completely abolished, and still remains in the shape of contraction. As to the inference that the part affected is the spine, that may or may not be; but is by no means necessary. The spine may be affected, we know, without causing contraction; and unless the envelopes of the chord or the chord itself are affected, contraction does not ensue. In the fifth inference also, he does not specify any reason why contraction and spasm should be the effect of inflammation of that part of the substance of the chord which governs motion, or the origin of the nerve, in this case, and not complete loss of motion.

It must not be denied that this subject is embarrassed with various difficulties and obscurities; and hence it is not wonderful that Mr Stafford has not made the subject much clearer than it was. The only probable method of removing these difficulties, and clearing the obscurities, is by examining the subject in a comprehensive manner, and not looking merely to the phenomena of spasmodic contraction when connected with the spine alone.

1. Thus it is known that the same involuntary spasmodic incurvation of the extremities take place in various diseases of the brain or its membranes. In the early stage of inflammation or hemorrhagic congestion of the brain or its membranes, before the inflammatory action has proceeded to the formation of morbid products, and while the vessels are still merely injected, this spasmodic inflection of the superior extremities is a common symptom. From the circumstance of its appearing before palsy is complete, and chiefly in the early stage of the disorder, it may be justly inferred that it arises from, and depends upon, irritation of the cerebral matter by the presence of an unusual quantity of blood in the cerebral vessels.

2. In various cases of that form of meningitis which terminates in the effusion of serous or sero-albuminous fluid within the ventricles and in the subarachnoid tissue, this symptom is observed in the early stage of the disorder; and where the disease does not prove fatal, it not unfrequently leaves one arm, or one leg, or an arm and leg of one side, in that state for life. We have already referred to the spasmodic contractions of the thumb and fingers or toes, taking place in children in connection with symptoms of *laryngismus stridulus.*

3. When the lower extremities are affected with spasmodic and involuntary inflection, it may be inferred that the membrane of the spinal chord, or the spinal chord itself, or both, are irritated by the early or incipient stage of inflammatory congestion. It is not likely that the stage of inflammation is fully established; and much less likely that it has given rise to new morbid products; because in either case motion would be more completely impaired than it is, and perhaps would be entirely abolished. At least we find that a very small amount of morbid products is quite sufficient to abolish motion and sensation in the lower extremities.

This seems to afford the explanation of the phenomena in the first case given by Mr Stafford. Had the spinal chord or its investments been affected with organic changes or morbid products, the limb could never, by any species of treatment, have recovered its faculty of motion. There is every reason to believe, however, from the symptoms, the progress of the case, the effects of the treatment, and its ultimate termination, that the morbid state consisted in irritation of the spinal chord and the roots of the nerves, by the overloaded state of the vessels, either of the membranous coverings, or of the spinal chord itself.

4. It is not easy to perceive any good reason for saying that the spine itself, properly so named, is affected. Certain it is that this contraction may take place without affection of the spine, and

it is not less certain that the spine may be affected for some time without giving rise to the spasmodic involuntary contraction. The reason of this is, that it is not the spine, but the spinal chord that is the seat of the morbid action; and the spinal chord is not affected primarily, but only in consequence of its membranous investments being affected; and these again may be affected either with or without previous disorder of the vertebræ.

5. There is in this inquiry another circumstance deserving attention, relative to the mechanism, as it may be termed, of the spasmodic involuntary contraction of the flexor muscles of the extremities. From the effects of breathing various sorts of vitiated air, for instance, a given quantity of air slowly contaminated with the combustion of candles or charcoal, without its being duly changed, it must be inferred, either that this inhaled air combining with the blood and circulating to the brain, can produce this species of contraction, or that the blood, not properly and thoroughly divested of its carbonaceous matter, and circulated to, or allowed to remain in the vessels of the nervous system, is adequate, by irritating the brain and spinal chord, to produce the same phenomena. Admitting this inference, which, indeed, cannot be denied, then it follows that spasmodic or involuntary contraction of the muscles of the extremities may occasionally be the result of irritation of the spinal chord and nerves by the presence of blood which has not been duly aerated, and which, therefore, acts something in the manner of a poisonous irritant. The only objection to this mode of viewing the question is, that it may be argued that, were this the cause, the whole mass of blood ought to be equally vitiated, and the whole nervous system ought to be equally irritated; which, however, is not the fact in this class of cases. It may be answered, nevertheless, that it is possible to conceive local poisonings of the blood in particular orders of vessels, and, consequently, local poisonous irritations of particular parts of the nervous system. Thus there is nothing absurd or physiologically inconsistent, in supposing that the vessels going to the dorsal or the lumbar region of the spinal chord may, from some cause, be prevented from returning their blood to the veins, and thence to the lungs, to be aerated with the general mass, or that the veins themselves coming from that region may be obstructed, and thus be prevented from returning the blood, which then may act as an irritant.

But whether we adopt this view or not, it is quite certain that either congestion, or that state of the vessels constituting inflammation, will, when seated in the spinal chord or its membranes, give rise to irritation. In all cases of congestion, and also in the injection of inflammation, whether the blood is moved more rapidly or more slowly than natural at first, it is always moved more slowly than natural as the process advances; and this diminution in the facility and velocity of its motion is constantly increasing, while the process continues, until at length it almost stagnates or remains quite motionless. In this change in the circulation of the part, it is not merely the slow motion and the consequent increased quantity of blood in the vessels of the part that constitutes the lesion. There is also a very important change in the qualities of the blood. As the blood is not easily and freely returned by the veins, but remains in the vessels, dark, loaded with carbonaceous matter, and unchanged by the action of respiration;—such blood cannot fail to be an irritant of the nervous matter; and accordingly it first irritates the matter of the spinal chord, and perverts or subverts its most characteristic functions, and it afterwards, if continued, extinguishes these functions.

It is in the first stage of any morbid action implying either of these states that the substance of the chord is irritated by this unaerated blood, and consequently that the nerves cease to have power over those muscles, the motions of which in the healthy state they perfectly control and regulate. The moment the blood is thus poisoned, even in a very slight degree, the chord will cease to perform its functions aright, and will cease to control, according to the will of the individual, the motions of the muscles, and spasmodic, and abnormal, and involuntary motions will ensue.

We think it is scarcely possible to doubt that in all the class of cases similar to those recorded by Mr Stafford, one of the most essential causes of the abnormal and involuntary contraction is the presence of unrespired, unaerated, or undecarbonated blood; and whatever other change may be induced, this at least must be present.

6. A considerable puzzle is presented to the physiological inquirer in the class of muscles in which this abnormal action evinces itself. It is to be observed that it appears in the flexor muscles solely, which contract not only with undue force, but without the influence of the will. The extensor muscles in the meantime lose all power of every kind, and not only has the individual no power of moving them, but they lose the power of resisting the action of the flexor muscles. In this lesion, therefore, there are united loss of power or palsy of the *extensor* muscles, and abnormal, or spasmodic, but involuntary action of the *flexor* muscles. The question then comes to be, what state of the nervous system or of the nervous matter of the spinal chord does this lesion imply? Is there a possibility that the origins of the nerves supplying the flexor muscles are affected with one sort of lesion, while those of the nerves supplying the extensor muscles are the seat of a lesion of a different sort, or, it may be, slighter in degree? There is no mode at present known of determining this point; and it may be doubted, when the intricate mode in which the origins of the nerves

are mingled in the spinal chord is remembered, whether it is possible to say that one part should be injured in such a manner as to cause the origins of the nerves of the flexor muscles to be in the state of irritation, while those of the extensor shall be in the state of paralysis.

One point in the question, nevertheless, deserves attention. It is an anatomical fact, that the nerves connected with the flexor muscles are much larger and more numerous than those connected with the extensor muscles. Thus the masseteric nerve, the external and internal temporal nerves, and the buccinator nerves, which supply the muscles that shut the lower jaw, are much larger than the nerves which supply the digastric muscles and the depressors of the lower jaw. The branches of the axillary nerve that are connected with the flexor muscles of the humerus and fore-arm are larger than those connected with the extensor muscles of the same parts; and, lastly, the sciatic nerve, which is expended chiefly upon flexors of the leg, is much larger, and furnishes larger branches than the anterior crural nerve, which supplies chiefly extensor muscles.

From these facts it seems probable, that one reason why the limb is forcibly and spasmodically contracted as a consequence of irritation or other disorder of the spinal chord and the origins of the nerves is, that the nerves connected with the flexor muscles are so much larger and stronger than those connected with the extensor muscles; and consequently, when from any cause the connection between the central part of the nervous system and the ramified, is destroyed or interrupted, then the nerves being so much more powerful, necessarily act with such vigour as to overcome the resisting power of the extensors.

On this point, however, we must not dwell. In conclusion, it may be expected that we say something of the mechanical means so ingeniously and assiduously employed by Mr Stafford. In his hands the contrivance employed appears to have been more useful than we could have expected, considering the cause of the contraction; for we confess that we could scarcely have imagined mere mechanical means to overcome a contraction depending on a pathological change. We can only say that the success of Mr Stafford is sufficient to encourage others to make the attempt; but we must add, that they need not be astonished, if they find that they are less successful than he was.

ART. VI.—*Researches on the Developement, Structure, and Diseases of the Teeth.* By ALEXANDER NASMYTH, F. L. S., F. G. S., &c. London, 1839. Pp. 165. Seven Plates.

THIS volume is only the introductory or historical part of the work which Mr Nasmyth intends bringing out; yet it necessarily contains much valuable information, of which we shall endeavour to give a short abstract.

Herodotus mentions that among the Egyptians the care of the teeth was assigned to a particular class of persons. But whatever knowledge they might have had seems to have been lost by the time of Hippocrates, as his notions are extremely crude. He believed the teeth to be a glutinous increment from the bones of the head and jaws, of which the fatty parts were dried up by heat.

Aristotle's information does not appear to have been much greater, as he asserts that man has more teeth than woman, and that this is observed as a sexual distinction among the lower animals; that the teeth differed from bones in this particular, that they increased in length during the whole of life, whereas the bones have a determinate limit to their growth.

Aretæus and Pliny do little more than repeat the statements of their predecessors. Pliny mentions the indestructible nature of the teeth, and the fact of their having been found in sarcophagi quite entire, when all the other bones had disappeared.

Galen was probably the first who showed that the teeth are formed during gestation, but remain hid in the alveoli till birth; that the molars of the upper jaw had three roots, those of the under jaw only two; and that the canines also received the name of eye-teeth, from the circumstance of receiving branches of a nerve which is also distributed to the eye. He pronounced them to be true bones, and possessed of sensation.

Aetius describes the teeth as open at the roots, where they admit small nerves coming from the trifacial, and hence are the only bones which can become painful of themselves, and that they grow till old age by the deposition of a nervous fluid in their interior.

Albucasis was the first to describe the process of restoring teeth, either by the human teeth or by artificial ones made of the bones of the ox. Vesalius considered the milk-teeth as the germs of the permanent ones. Eustachius, however, gave the most correct description of the number, form, and varieties of teeth. He compared the adhesion of the teeth to the gums to that of the nails to the skin; and taught that the hardness of the teeth was proportioned to the ferocity of the animal. He also recognized two structures, the enamel and the bony part, comparing the mode in which the enamel invests the bony part to that of the bark investing trees. He refutes the opinion, that the second set are formed on the germs of the first set; and says that if the germs of the second set are not recognized in the fœtus, it is not because they do not exist, but because they are too small to be visible.

Ambrose Paré gives a very correct account of the number, position, uses, attachments, and connections of the teeth. He was the first to mention the operation of transplanting a tooth; and many of his directions for operating are admissible even at the present day.

Malpighi describes the teeth as being composed of two structures; of which the interior, presenting a bony lamellar appearance, was formed of capillary fibres interwoven into a kind of net-work. He also describes the peculiar structure of the root, and the follicle which fills the hollow part of it, and mentions the fibrous structure of the enamel.

Leeuwenhoek, one of the most accurate observers of his day, examined the structure of the teeth with the microscope, and found them to be composed of very small straight and transparent tubes, six or seven hundred of which put together would not exceed in thickness the hair of a man's beard. He describes the enamel as surrounding the other portions, and as composed of fibres which run perpendicularly to the other portions of the tooth. He also detected crystals in the interior of the teeth of horses. Winslow and Ludwig both agree with Leeuwenhoek as to the fibrous structure of the enamel, and describe minutely the arrangement of its fibres.

Duverney compared the membrane which enveloped the tooth whilst it was still within the gums to the choroid membrane of the fœtus, and gives it the same name. He states that the follicle has the form of the tooth which it is destined to produce; that the membrane abandons the tooth at the period of its extrusion, and remains in the alveolus of which it forms the periosteum.

Bertin affirmed that the enamel was continued over the whole tooth, but that it became very thin towards the roots.

Herissant described two kinds of gums, one, the permanent gum, the other, that which exists before the cutting of the teeth, formed of a tough tissue lining the whole extent of the alveolar arch, and closing up the alveoli; and that when the teeth cut through this gum, it becomes exfoliated, and is thrown off in shreds. He considered the sac which contained the dental follicle to be a prolongation of the temporary gum, and the organ of the secretion of the enamel.

Jourdain describes minutely the dental follicle from its first appearance in the fœtal jaw till the period of birth. He also notices the existence of two canals in the lower jaw of the fœtus, one of which is only a furrow destined for the transmission of the vessels and nerves of the milk teeth, the other for those of the permanent teeth.

Mr John Hunter added many valuable facts with regard to the structure and economy of the teeth. He agrees with Herissant that the enamel was formed from the sac previous to the cutting of the tooth, and that it was quite inorganic. He describes the roots of the teeth as being covered with periosteum derived from the alveolus, which periosteum was prolonged into the interior; that the bony part of the tooth was analogous to bone; and that the milk teeth were not removed by the mechanical agency of the permanent set.

Mr Nasmyth is far too severe in his criticism of Mr John Hunter's work. It is not fair to compare the knowledge of any branch of science whatever of the year 1778, with that of the year 1839. As compared with any work on the teeth extant at the period of its publication, Mr John Hunter's treatise will be at once acknowledged as the chief; and the very fact of its being, up to the present day, a standard work of reference, not only for the anatomical structure, functions, and diseases of the teeth and jaws, but also for the chief operations of dental surgery, marks the public opinion as to its merits. Any attempt made to undervalue the writings of an author who did so much for the advancement of dental anatomy and physiology, can injure none but the individual who makes it. That he copied slavishly from the works of Ambrose Paré, or from any one without acknowledgement, we deny. No man was less guilty of copying from books than John Hunter. No man laboured more assiduously to copy after nature.

Bichat was unable to decide whether the enamel was organic or inorganic. He notices that the second set of teeth evidently grow both longer and also thicker after their appearance above the gum, but that the lengthening takes place only by the root; that the amal of the root, and cavity of the body of the tooth become gradually narrower, and at length become obliterated; that the earthy matters so predominate over the gelatinous parts that the vitality of the tooth becomes extinguished; that the vessels and nerves no longer penetrate it, and it drops out, presenting a phenomenon similar to the shedding of the horn in the Cervine tribes. He regards the dental capsule of the fœtal jaw as a shut serous sac lining the alveolar cavity, and adhering to it by prolongations; that it is reflected over the pulp where the vessels and nerves enter, so that the pulp and vessels, though covered by it, are actually outside its proper cavity.

Blandin considered the teeth as productions of the mucous membrane, analogous to the nails and hair; and supposed this to be proved by the fact, that the dental follicle, previous to the extrusion of the tooth, is not a shut sac, but continuous with the membrane of the mouth, by means of a canular prolongation. He describes the membrane of the dental follicle as composed of two layers, the one, external, fibrous, which afterwards becomes the alveolar periosteum; the other, internal, villous and vascular, which forms the cavity of the follicle. The pulp again he found to consist of a nervous and vascular expansion, similar to the papillæ of the integuments which form the hairs. He conceived the tooth was formed on the exterior of this pulp, but was not able to satisfy himself of the mode in which the enamel was secreted.

Dr Blake was the first to describe the *crusta petrosa*. Mr Fox paid considerable attention to the developement of the teeth, and mentions the fact of the early developement of the first molar. He considered the teeth to be true bones, differing only in having a covering of enamel, and in being more dense in structure; that the teeth were vascular, and subject to the same diseases as bones; and that decay depended on inflammation terminating in mortification; and that the pulp was the original seat of the inflammatory process, which, going on to suppuration, led to the extinction of the vitality of the tooth. He enumerates other causes of the decay of teeth, as faulty organization of the enamel or ivory, the crowded state of the teeth, the want of cleanliness, the deposition of tartar, disease of the gums, &c.

Mr Thomas Bell advocates the analogy of the teeth with true bone. He divided the membranes of the teeth into deciduous and persistent, the deciduous being the two lamellæ of the capsule, and the persistent being the internal periosteum of the dental cavity, the periosteum of the root, and the periosteum of the alveolus.

Baron Cuvier, in his work on Fossil Remains, regarded the teeth as non-vascular; that their only similarity with bone consisted in their analogous composition; and that the different substances which compose the teeth are produced by excretion, and in layers.

M. Serres, in his work on the Anatomy and Physiology of the Teeth, gives a very accurate account of the organization of these organs. He detected the rudiments or germs of the first incisors and small molar in the embryo of two months; the canines did not become apparent till two months and a half. In the embryo of three months, not only were the germs of the first set visible, but also those of the second, and even that of the wisdom teeth. These germs he found lodged in membranous folds, which form the gums at this early period of fœtal life; those of the first set being immediately attached to the fold, those of the second suspended from it by means of a pedicle about two lines long. In the four months fœtus, he found membranous partitions separating the incisors, but all the other germs were contiguous to each other. At six months osseous partitions were very distinct between the incisors, and those of the small molar were also partly ossified, but the two posterior molars were contained in the same division.

He mentions that the pulps of the teeth are quite distinct from the capsules and the gums, and that he has succeeded in removing the pulps without disturbing either the capsules or the gums. The capsule or dental membrane he describes as composed of two layers. The external, fibrous and opaque, lines the alveolar cavity, serves as a periosteum, and is applied to the external surface of the inner layer. It adheres closely at its inferior part to the dental vessels and nerves; it also unites with the cartilage of the gums; and when the tooth has protruded embraces its neck. It is possessed of considerable elasticity, and compresses the liquid in which the tooth is plunged; this appearing to be its chief use. The internal membrane, which is very delicate and transparent, is highly vascular, and secretes a fluid between serum and mucus; he hence regards it as intermediate in its character between a serous and mucous membrane. It adheres with considerable tenacity to the external layer, particularly at the point where it corresponds to the fibro-cartilage of the gums. Where the nerves and blood-vessels enter the pulp, it separates from the external layer, and is reflected from below upwards, enveloping these as far as the base and inferior circumference of the pulp. Beyond this M. Serres was unable to trace it; so that he infers that the pulp is not covered by this membrane, but is free in the sac, and is bathed by the fluid which it contains. When the blood-vessels reach the base of the tooth they pierce the external membrane of the capsule, and are continued to the internal layer, where they ramify to such an extent as to render that portion extremely vascular. Several branches penetrate the substance of the dental bulb. All around the insertion of the internal membrane into the bulb the vessels are much more numerous than at any other part, and they form there a vascular circle, which descends in proportion as ossification advances. These vascular areolæ correspond in number to the roots of the teeth. He also describes what he calls dental glands, which are small cysts, disposed in regular groups over the whole cartilaginous gums of the infant. He considers their functions at this period of life to consist in furnishing fluid to lubricate the gums, but in the adult that their function probably is the secretion of tartar.

M. Serres considers the teeth as belonging to the osseous system, though not true bones, seeing they differ in many respects, as in not passing through a cartilaginous state, in having no periosteum, in not being affected by concentrated nitric acid, nor possessed of vascularity, nor subject to rachitis. The pulp he regarded as a veritable ganglion. He was one of the first to show that the first molar cuts the gum after the lateral incisors, and before the canine teeth. He does not appear to understand the mode in which the first set drop out, to allow room for the appearance of the second. His work, however, is extremely valuable, and did much to advance the knowledge of the anatomy and physiology of these structures.

Frederick Cuvier's learned work on the Teeth of the Mammalia is an interesting and valuable accession to the study of Natural History. He considers teeth as but appendages of the skin, inasmuch as they are secreted by similar organs, and are devoid of vessels and nerves, and consequently insensible. The teeth of the Ornithorrhynchus he regarded as the most simple, being composed entirely of gelatine. Teeth, he says, are composed of a secreting and a secreted portion. The first is placed internally, and is composed of vessels and nerves; the latter is placed externally, composed of a certain number of substances entirely non-vascular, and removed from all immediate connection with the system at large. Only three substances enter into the structure of this secreted portion;—enamel, ivory, and cortical matter; and he classes teeth under four heads, according as they are composed of the whole of these three substances, of ivory and enamel, of ivory and cortical matter, or of ivory alone.

He states that the capsule is in every instance adapted to the nature of the tooth to be formed from it. Thus those teeth which are composed of three substances have the capsule divided into three portions, which are to be regarded as distinct organs. The first of these is the central portion or bulb, which produces the ivory; the second is in the form of a membrane, which produces the enamel; and the third envelopes all the others, and produces the cortical or external ivory. The bulb he conceives to be composed entirely of blood-vessels and nerves, surrounded by the enamel-forming membrane, excepting at its base, where this membrane terminates, and the functions of the external membrane commence. He describes the ivory of the elephant's tusk as being deposited in concentric layers, but in the teeth of man, monkeys, and carnivorous animals, it appears to be fibrous. The enamel he regards as apparently crystalline, and the cortical substance as absolutely of the same nature as the ivory.

M. Rousseau, in his work on the Comparative Anatomy of the dental system in Man, and the principal Animals, confirmed many of the previous researches into the structure and physiology of the teeth. He differs, however, from Serres with regard to the order of succession. He traces the origin of erosion of the teeth to a congenital source, and explains it on the supposition that inflammation had attacked the small vesicles which secrete the enamel at the moment when the dental system was forming, and that in their place were left furrows or erosions. Rapid alternations of heat and cold he regards as one of the most frequent sources of accidents to the teeth, from causing cracking of the enamel. He notices that the inhabitants of large cities, and domesticated animals are most subject to decayed teeth, but he is unable to decide as to its special cause; whilst savage tribes and wild animals appear to be free from this decay.

Purkinje asserts, that there is a layer of proper osseous substance on the outer surface of the root of the teeth. He examined thin layers of the proper dental bone, or ivory, by means of the microscope, and found it composed of a uniform structureless substance, which formed the greater portion of the tooth, and of fibres passing through this. These fibres he recognized as tubes, which in the tooth of the horse, by capillary attraction, became coloured with ink. These tubes were first shown by Leeuwenhoek, but his researches appear to have been quite forgotten. When these sections of the ivory of the tooth were subjected to the action of an acid, the white colour of the fibres disappeared; but the remaining cartilage still presented the appearance of tubes as before. Hence it follows that the tubes have an organized basis, a membrane probably, saturated with calcareous earths. The unorganized substance consisted chiefly of calcareous substance.

The enamel Purkinje found to consist of perpendicularly placed fibres, increasing somewhat in size towards the upper or outer extremity, forming quadrilateral prisms, and often making several waves on one and the same level. These fibres adhered to lamellæ which ran transversely round the tooth, and generally rested obliquely on the surface of the dental substance. Most of these results have been confirmed by Müller.

The interior of the roots of old teeth these two observers found to consist of bone properly so called, as also the exterior covering of the fang; they contain no horn in their composition, but cartilage, which yields glue. The whalebone and other corneous formations which supply the place of the teeth in some vertebrated animals contain no glue, however long they may be boiled.

Professor Retzius of Stockholm, in his elaborate Microscopical Researches into the Structure of the Teeth, has thrown much light on this subject. He examined carefully the structure of the cartilage of the teeth after the osseous matters had been removed by means of acid, and found it composed of slightly undulating fibres, extending from the cavity of the tooth to the external surface. These fibres were hollow tubes, which had distinct walls, differing in appearance from the other parts of the tooth; and the cartilage had no apparent similarity to that of bone. When very thin slices of the ivory of the tooth were examined with the microscope, he found it to be composed of hollow fibres and ramifying tubes, the trunks of which opened into the cavity of the tooth, whilst their terminations, in the form of extremely fine branches, ran towards the surface. Under a reflected light, and on a dark ground, all these tubes seemed to contain a white matter. The tubes do not run in straight lines except towards the apices of the teeth, but form generally two or three wavy curves, the particular degree of flexion varying in different teeth, and in different parts of the same tooth. The matter filling the tubes presented a somewhat granular aspect, and was apparently calcareous from its being removed by the action of an acid. When the wall of the cavity of the tooth was examined by the microscope it was found to be perforated with an infinity of small orifices, the openings of the tubes which formed the fibres of the ivory.

The enamel he found to consist of solid hexagonal prisms, one end resting on the ivory, the other forming the external surface of the tooth. It adhered internally to a membrane, probably the membrane from which it was secreted, which was found to be of a very indestructible nature, having been even recognized in fossil teeth, and when the enamel has been removed by means of acids has floated on the surface of the liquid. This membrane was perforated in every part, but showed no trace of fibrous structure. Elevated undulating lines were observed running from side to side of the enamel of the well-worn tooth. These he believed to mark the various growths of the enamel during its formation. He did not ascertain whether they existed in the milk teeth. Where the enamel joins the ivory a number of minute chinks were almost in every case observed appearing to arise from the shrinking of the fibres from each other. This circumstance induced Retzius to believe that each prism or fibre of the enamel is originally surrounded with a capsule of organic matter; and, in fact, when newly formed enamel is subjected to the action of an acid, small portions of organic matter are left, which retain the form of the prism, though these are not perceived in the full grown teeth.

Round the roots and neck of the teeth he found a structure which presented some similarity to the osseous tissue, both from its containing cavities filled with white matter, and from possessing a number of winding anastomosing tubes opening into these cavities. This is the cortical substance. It begins at the neck where the enamel terminates, and is continued to the extremity of the root, increasing in thickness as it descends. It consists of cartilage and osseous earth. In young teeth this cortical substance or cement is very thin; in old teeth, when the cavity of the tooth is almost obliterated, it often forms a considerable enlargement called an exostosis.

Retzius examined in the same careful manner a number of teeth of the mammalia, reptiles, and fishes, and he describes carefully and in detail their varied appearances. From this it appears that the ivory of the tooth is the most universally distributed and most essential part of the tooth, being found in almost all the vertebrated animals which are possessed of these organs. In fishes, speaking generally, the whole teeth are composed of this substance, excepting in a very few, which have the very tips pointed with enamel.

Baron Cuvier and his brother showed that, by the careful study of the external characters of a tooth, the species of animal to which the tooth belonged might be pretty accurately determined; but as in all the species of animals whose teeth have yet been examined by the microscope, some slight modifications in the direction, form, size, and mode of branching of the tubes, and disposition of the cells, have been observed, it is to be expected that the indications to be drawn from the examination of the teeth in this manner, will be much more determinate.

Recent researches have done as much for the increasing our knowledge of the developement of the teeth, as they have done for that of the internal structure of the full-grown tooth. Arnold and Goodsir consider that the process of dentition ought to be divided into three stages; divisions well marked during the process of dentition, being indicated by the position of the pulp, in relation to the cavity in which it is contained. Mr Goodsir denominates these stages the follicular, the saccular, and the eruptive. He thinks there may be said to exist another stage previous to these, when the pulp is in the state of a mere papilla on the surface of the mucous membrane; but he prefers including this in the follicular stage, on account of its very brief duration.

Mr Nasmyth has unaccountably omitted to give an account of these interesting researches of Mr Goodsir,—a circumstance of less consequence to our readers, as they will find Mr Goodsir's paper in the number of this Journal for January last.

Mr Goodsir found that the first observable appearance of the germ of the tooth consisted in small papillæ, becoming visible in a groove of the fœtal mouth, which afterwards becomes the alveolar ridge. Processes from the side of this dental groove approach each other, and meet before and behind the papillæ, so as to enclose them in distinct follicles. The edges of these follicles gradually grow over the papillæ, and at length cohere by the lips and walls when the papillæ assume the name of pulps, and the follicles become sacs. The pulps now become moulded into the form which the teeth afterwards assume; the bases of the pulps divide into as many portions as the teeth have fangs; and, as the sacs increase at this stage faster than the pulps, a space is left between them, in which is deposited a granular-looking gelatinous matter. The vessels are now seen connected with the base of the pulp, and ramifying on the true membrane of the sac, but without sending a single branch to the granular deposit. Tooth substance, then, begins to be deposited at the apices and tubercles of the pulps, and, in proportion as this goes on, the granular matter becomes absorbed. Before this time, osseous septa, first in the form of bridges, then of complete septa, have been formed between the teeth. Such is a very cursory sketch of Mr Goodsir's observations, but for the particulars, and much other interesting matter, we must refer to his paper.

Raschkow and Purkinje contradict the opinion of Arnold, and of course that of Goodsir, as to the dental follicles taking their origin from the mucous membrane of the mouth, having never been able to see them either in man or in the lower animals.

Raschkow has described a new membrane, which he says exists between the follicle and germ, destined for the formation of the enamel. The internal surface of the membrane consists of hexangular, nearly uniform corpuscles, visible only through a magnifying glass, towards the centre of each of which is a rounded eminence. These corpuscles are the ends of short fibres, of which the membrane is composed, and which, by being pressed together, freely assume the hexangular form. These are disposed in regular series, and correspond exactly with the enamel fibres formed from them. The enamel membrane is never so evidently separate from the parenchyma or germ at its lower extremity as it is over the other parts; and he hence infers, that, as the enamel is formed there at a later period, the membrane continues to grow there till the enamel has been perfectly formed. Each of these short perpendicular fibres is to be regarded as an excretory gland. An organic lymph seems to be secreted from the parenchyma of the enamel membrane which penetrates the enamel fibres, and renders the whole soft. Subsequently, it enters into combination with earthy matters, and so forms the enamel. Raschkow found it existed as a hood in those teeth whose summits only are covered with enamel; whilst in the elephant and other animals, in whose teeth the 'enamel is deposited in the interior of the tooth, and continues to grow during life, this membrane forms a girdle of greater or lesser breadth, surrounding the basilar part of the tooth; and is continually becoming converted into an osseous membrane towards the crown; whilst, in the middle of the tooth, it is forming the new enamel.

In the dental germ, from the very first period of its formation, there is invariably found the dental pulp, composed of uniform globular granules, with no evident traces of cellular tissue, covered from the base to the apex with a peculiar pellucid membrane, which has no characteristic organization. This he calls the preformative membrane, seeing that in it the formation of the dental substance commences. Immediately under this membrane, the granules of the pulp are found arranged more regularly, being placed uniformly in longitudinal series at somewhat right angles to it, or somewhat obliquely. A number of elevations are then observed on the preformative membrane towards the apex; and immediately under the membrane, at this point, the proper dental substance begins to be found; commencing always at the coronal apex, and extending on the one hand towards the coronal fossæ, and on the other towards the root of the tooth. The membrane then becomes of stony hardness; the parenchyma decreases in proportion as the dental substance increases, and is withdrawn as it were into the dental cavity, which becomes gradually contracted.

The cement or cortical substance is always placed external to this enamel; and is consequently formed at a later period, after the formation of the enamel is completed, and the enamel membrane withdrawn or in some way transformed. It has been questioned what membrane it is which secretes the cement, whether the capsular membrane, which at this late period of the process of dentition coalesces with the periosteum of the alveolar process, or the enamel membrane somehow transformed. The latter M. Raschkow thinks is the more probable supposition; as in the Ruminantia, after the formation of the enamel has been completed, the simple enamel pulp remains without any connection with the alveolar parietes; and therefore this membrane is the only one which remains to form the cement. Besides, the enamel pulp on the outside of the tooth may at this period be combined with the periosteum; and this supposition is favoured by the circumstance, that the granular and tubular structure of the cement presents the greatest similarity to that of true bone.

Mr Nasmyth concludes this volume with hinting at a few objections which his own experience has led him to make; but he reserves the full exposition of his own views till the second volume is published. He informs us, that he has discovered that when the tooth is perfected and extruded, it is still covered with a capsular covering, which is seen to be continuous with the *crusta petrosa* or cement; and he has detected it in the teeth of so many animals, that he presumes it will be found universal. He mentions that in man this layer is darker than the enamel. If such be the case, Cuvier may be right, when he affirmed that the thin coloured layer on the front of the teeth of the Glires or Gnawers is composed of cortical or cement, and not enamel, as has been recently affirmed.

It may be remarked, that it would have given additional value to his performance, had Mr Nasmyth added the titles of the works to which he refers; it would at least have shown that he had seen the works; a circumstance which appears extremely problematical with regard to a great portion of them, seeing that more than one of the chance references he has given prove to be wrong, and the names of authors are erroneously spelt.

It appears to have been a fortunate circumstance for Mr Nasmyth that Retzius published a tolerably full historical account of the writers on dental anatomy and physiology up to his own time; and it can be easily imagined that Mr Nasmyth is only speaking the truth when he confesses that he has received from that work "much general assistance" in the compilation of his historical introduction. This at once accounts for the unusually meagre notice taken of the British writers, and equally explains the mistaking of names and the erroneous quotations. One merit alone the work has, and that is, that it has put in an English dress the discoveries of Retzius and Raschkow.

ART. VII.—1. *An Inquiry into the Pathology, Causes, and Treatment of Puerperal Fever; being an Essay for which the Fothergillian Gold Medal was conferred on the Author, by the Medical Society of London in March* 1835. By G. MOORE, F. R. C. S., &c. London, 1836. 8vo. Pp. 247.

2. *Essays on the most important Diseases of Women.* By ROBERT FERGUSON, M. D., Fellow of the Royal College of Physicians, London, Professor of Obstetric Medicine and Diseases of Women and Children, King's College, London, &c. &c. Part I. Puerperal Fever. London, 1839. Post 8vo. Pp. 299.

UPON few subjects has pathological inquiry been so assiduously and so successfully employed during the last fifteen or eighteen years, as upon that of puerperal or childbed fever; and the pages of this Journal, both in its original department, and in that of the analytical reviews, afford clear and unquestionable evidence of the manifold attempts which have been made to elucidate the nature of this unmanageable distemper. We have only to refer on the one hand to the Report of the Vienna Physicians,* the essays of Mr Cusack,† Dr Ingleby,‡ Mr Renton,§ and Mr Sidey,‖ exclusive of isolated cases on particular points, pathological and practical; and on the other, to the accounts given in this Journal of the researches of Tonnellé, Dance, Duplay, and Luroth,¶ and those of Dr Lee,** in proof of the correctness of what is now stated.

Since the time when these performances came under notice, the two monographical essays have appeared, the titles of which are placed at the head of this article.

Of the first we have only to say, that it is a respectable and useful compilation, and presents within moderate compass a correct view of the results of the labours of the authors already mentioned, and forms on that account a convenient book for initiating the obstetrical student in the knowledge of the nature and various forms of this distemper. As we entered so fully into detail in giving an account of the researches of MM. Dance and Tonnellé, Duplay and Luroth, and Dr Lee, we could not, without the risk of repetition, attempt to give any analysis of this performance, which may itself be characterized as a just and useful analysis of the labours of these and some other authors.

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* Edinburgh Medical and Surgical Journal, Vol. xxii. p. 83.

† A Brief Notice of the Disease termed Puerperal Fever, Edin. Med. and Surg. Journ. Vol. xxxi. p. 25.

‡ On Epidemic Puerperal Fever. By J. T. Ingleby, Lecturer, &c., Edin. Med. and Surg. Journ. Vol. xlix. p. 412.

§ Edin. Med. and Surg. Journ. Vol. l. p. 67.

‖ Cases of Puerperal Fever by Charles Sidey, Edin. Med. and Surg. Journ., Vol. li. p. 91.

¶ Edin. Med. and Surg. Journ. Vol. xxxiv. p. 328.

** Ibid. Vol. xxxviii. p. 145 and xl. p. 198.

The volume of Dr Ferguson, which is the beginning of a series of essays on the diseases of women and children, may in some sense be considered much in the same light, but in another respect it is entitled to separate and distinct attention. The author, as Physician to the General Lying-in Hospital, has had occasion to treat or to see during the space of twelve years about four-fifths among 204 cases of puerperal fever; and from the phenomena presented by these cases, and the morbid appearances furnished by those in which the fatal termination ensued, Dr Ferguson has derived the materials employed in the composition of his work. Besides the source of information now mentioned, however, the author has availed himself of the facts collected by Tonnellé, Dance, Duplay, and Luroth, those of Dr Robert Lee, and those given by Dugés in the work published by Madame Boivin and that author.

The circumstances now mentioned render it unnecessary to enter into a detailed view of the work of Dr Ferguson, but suggest the propriety of giving a short abstract of the most characteristic features of his performance, and of the peculiar views which he takes on the nature and essence of puerperal fever.

Dr Ferguson has been led, by the phenomena of the cases which he has witnessed, to distinguish puerperal fever into four forms; each possessing distinct general characters, and requiring for its cure a distinct method of treatment. The *first* is what he denominates the peritoneal form, as the intensity of the distemper seems to be expended chiefly on the peritonæum, and the morbid action lingers longest on that membrane. The *second* is the *gastro-enteric*, and is distinguished by the disorder presenting much of the characters of common fever, sometimes of the remittent, sometimes of the intermittent type, with much disorder of the abdominal viscera, and sometimes terminating fatally by the sudden supervention of peritoneal inflammation. The *third* is what he styles the *nervous*, from the circumstance of the predominant symptoms being those which indicate the presence of disorder of the brain and nervous system. And the *fourth* he designates as *complicated*, because it comprises the symptoms and lesions of the other three, with the remarkable additional circumstance, that its action betrays a tendency to fluid deposition in any or in every tissue. The fluids deposited are blood, serum, purulent matter, and lymph. This last form the author represents to be the most frequent and fatal, and in crowded hospitals, and with circumstances of poverty and misery, most intractable by remedial measures, and on all these accounts consequently to have attracted most attention.

In considering the first form of the disorder, viz. that distinguished by the presence of abdominal pain, Dr Ferguson observes, that puerperal cases present two forms of abdominal pain, the one, durable and dangerous, the other, transitory, and, if uncomplicated with other disease, easily removed. He allows, however, that the transitory form of abdominal pain passes into the second or permanent kind. This circumstance must tend much to confuse the diagnosis of the disorder, and prevent the practitioner from determining at the first, in every case, in which abdominal pain comes on soon after parturition, whether that pain indicates the presence of puerperal peritonitis or not. A remarkable circumstance, which is believed to show, that the disorder which causes the transitory pain, is not the same as genuine peritonitis, is the fact, that it is relieved and finally removed by remedies, which have no control over pure and genuine peritoneal inflammation. Thus, the administration of a dose of Dover's powder, followed by laxative medicine, so as to open the bowels efficiently, or a few doses of calomel and opium, or even an opiate, are often followed by rapid and permanent subsidence of the pain. " Here, then," says Dr Ferguson, after adducing several examples of the disorder, " are instances of a peritoneal affection observed at different times by different persons, bearing the usual characteristics of violent inflammation, and yet yielding to remedies deemed inefficient in true peritonitis."

It appears that this disorder or species of abdominal pain, always attended with febrile symptoms, was very prevalent in the year 1827, and part of 1828, especially along the banks of the Thames ; and that it was known by the name of false *peritonitis.* In most of the cases, one, or at most two, ten grain doses of Dover's powder, administered in routine by the matron of the hospital, were followed by removal of the pain, and ultimate convalescence.

So far as we understand Dr Ferguson's reasonings on these facts, he regards this as one form of puerperal fever, and more particularly as that form, which has appeared at one period to be relieved and even cured by very trifling, or at least not powerful remedies, such for instance as the ipecacuan proposed by Doulcet, the James's powder in the hands of Boer, and laxatives in the practice of Richter, all of which have been found inefficient in other instances.

Regarding the pathological nature of this form of puerperal fever, Mr Hingston, who had occasion, as pupil to the hospital, to see many cases of it, regards it as nervous, but only in the sense in which a nervous impression precedes every attack of inflammation ; the peculiarity being its permanence in this early stage.

Mr Griffin regards it as nervous pain, dependent on spinal irritation. M. Tonnellé looks on it as connected with the presence of purulent matter in the veins.

These opinions Dr Ferguson considers as not in reality different, unless in being part of the truth only. He thinks, and attempts afterwards to prove, that the proposition of M. Tonnellé requires, in order to be generally applicable, to be converted into one representing the vitiated state of the blood in general, and not confining it to a single cause, viz. the circulation of purulent matter. Other products of inflammation, as well as purulent matter, he argues, may vitiate the blood; and we often recognize the genuine marks of vitiated fluids without being able to detect any purulent matter in the vessels. With this idea also of M. Tonnellé he thinks the opinions of Mr Hingston and Mr Griffin are quite reconcilable.

The diagnosis of this temporary and easily assuaged abdominal pain Dr Ferguson allows to be particularly difficult. If the pain be sudden in its approach; if there be intermission; we may expect, he thinks, relief from opiates. If there be well well-marked remission, the same treatment will be employed with advantage. If, on the other hand, the pain be constant, opiates may be employed in the first instance, providing the previous experience of the reigning epidemic, shows that the peritoneal pain has in other cases easily shifted. In doubtful cases, the opiate treatment may be first employed; and if, after two ten grain doses of Dover's powder, it does not, in the course of four hours and a-half, produce manifest alleviation of the pain, depletion, general or local, must be employed.

From these facts it appears that the mode of recognizing the true nature of this abdominal pain is very much empirical, that is, it is impossible to say, without the empirical employment of remedies, whether the pain be inflammatory or not. This we believe is what all good practitioners do; that is, where the symptoms are not so clearly marked, as to enable them to say at once, that these symptoms denote the existence of peritoneal inflammation. It is only where the symptoms persist, notwithstanding the use of the opiate or rather the diaphoretic opiate, that it becomes imperative to adopt a more decided and active method of practice. It may at the same time be observed, that neither the curative effect of the diaphoretic opiate proves that the pain was not of inflammatory character, nor does it appear very consistent to say that a vitiated state of the blood could be removed, or the effects of the presence of purulent matter in the circulation be counteracted by the exhibition of twice ten or ten times ten grains of Dover's powder.

It may be safely asserted that, in the early stage of peritoneal inflammation, there may be an irritative condition much more intense in its manifest action by the feeling of pain, than could be inferred from the other symptoms, and therefore at that period of the distemper, capable of being assuaged and prevented from passing into the strict and genuine inflammatory stage, by the seasonable administration of proper remedial agents. That the sensation of pain in thus assuaged, and the accompanying symptoms removed, is no proof that the disease might not have proceeded to inflammation. Had not these remedies, indeed, been employed at the time at which they were administered in the respective cases, there is every reason to believe that the stage of irritation would have proceeded to that of inflammation, when remedies of a more powerful and active character are required.

With regard to the notion, that this species of abdominal pain is associated with a vitiated state of the blood, and particularly with the presence of purulent matter in the veins, we conceive that the inference is not only not proved, but that it is actually contradicted by the facts of the cases, and above all by their events. Had this substance being actually in the veins, or had the blood been already vitiated by any morbid product, is it consistent with the known laws of pathology to imagine, that either the purulent matter could have been removed or prevented from exercising its effects on the system, or that the state of the blood could have been restored, by the administration of a few doses of Dover's powder, or even by the use of calomel and opium in the small amount in which it appears to have been given? To us it appears that every one who has witnessed the effects of the presence of purulent matter in the veins, will at once admit that the thing is impossible, or at least so unlikely, that it is an event not to be anticipated or expected.

Of the second or permanent form of peritoneal pain, Dr Ferguson says only that it indicates genuine and fully developed peritonitis, requiring the prompt use of all those remedial measures, by means of which inflammation can be subdued or its effects can be prevented from taking place. This admission may, it appears to us, be employed as a conclusive argument to prove that the form in which the abdominal pain is temporary, is merely the incipient or irritative stage of that in which the abdominal pain is permanent.

The second form of puerperal fever, or that distinguished by gastro-enteric irritation, Dr Ferguson represents to assume the characters of mild typhous fever with symptoms of intestinal irritation, to be either without any peritoneal affection at all, or with it in so slight and temporary a form as speedily to be lost in the general or constitutional symptoms,—which last during the whole course of the illness, and which varies from seven to twenty days. He allows, however, that this form of the distemper rarely or never terminates fatally without becoming complicated with acute inflammation either of the peritoneum, or some of the thoracic viscera, or deposition within the joints or limbs, followed by colliquative diarrhœa. He further mentions that, in fatal cases, the womb is found congested and enlarged, its inner mucous surface superficially softened, or its veins or lymphatics containing purulent matter; and he adds, that when the womb is affected with extensive softening, all the characteristic symptoms of the disorder are lost and obscured in the obvious symptoms of an overwhelming and fatal typhoid fever.

These facts show very clearly that the apparent typhoid symptoms are produced either by the process of softening of the womb, the *putrescentia* of Boer, or by the presence of purulent matter in its veins and lymphatics. It may be justly proposed as a pathological question, to what extent it is correct to represent this as puerperal fever with gastro-enteric irritation.

Of the third or nervous form, we must give the description of the author, as we cannot otherwise hope to convey a just notion of its peculiarities.

> "This, in its pure and isolated form, is by far the most rare of all the various kinds of puerperal fever; although it is by no means unusual in the other forms of this malady, to witness a marked and sudden onset of anomalous nervous symptoms, which for several hours change the current of the former signs, and are characterised by terror of mind, great coldness of the skin, much agitation and by a sense of impending death, from faintness and extreme prostration. Those in whom the nervous character is the sole, or at least the most prominent part of the puerperal fever, exhibit all its symptoms in all their irregularity and inconstancy; there is painful and sudden abdominal tenderness, which subsides with extreme rapidity; there is a rapid pulse, great restlessness, and mental uncertainty and agitation, together with shifting functional disturbance of various organs; sighings, tremors and cramps; sudden and death-like sinking, and as sudden re-appearance of strength; with these, there are nevertheless, from the beginning of the attack, unequivocal marks of deep injury to the nervous system. The faculties and feelings are strangely disturbed, and the terror the patient expresses, or the furious delirium which often ushers in the attack, soon gives way to fatal coma, or sudden syncope."—Pp. 25–26.

The fourth form of the disorder is of a nature still more complicated and formidable. It seems to embrace, in general, all the other varieties, so far as its symptoms are concerned; and in general the lungs present marks of disorder during life, and lesions of great extent and severity after death. Depositions of purulent matter also are liable to take place not only within the different serous and synovial membranes, but in the cellular tissue between the muscles and in their substance; and in several cases this destructive suppurative inflammation attacks the eye, causes the secretion of purulent matter within its chambers, and totally destroys the organ.

This unmanageable and fatal form of puerperal fever, however, the author allows, is seen only in lying-in hospitals. "I believe," he adds, "that the single chamber of the pauper is more wholesome than the spacious ward of the hospital patient; while in private practice among the well-housed and well-nourished, the milder forms are the commonest." There is no doubt that lying-in hospitals tend to produce the most formidable and destructive varieties of puerperal fever; and by far the safest plan, where the disease manifests a tendency to appear, is to keep the females requiring attendance at their own houses.

The second chapter is devoted to the morbid anatomy of the disease; but as that was fully considered in our account of the researches of Tonnellé, Dance, Danyau, and Luroth, and the work of Dr Lee, and as the present author gives the results obtained by these inquirers, it would only lead to repetition to dwell on the subject at greater length.

In the third chaper, Dr Ferguson considers the nature of puerper fever; and states his views on that subject in the form of the three following propositions.

1. The phenomena of puerperal fever originate in a vitiation of the fluids. 2. The causes which are capable of vitiating the fluids are particularly rife after child-birth. 3. The various forms of puerperal fever depend on this one cause, and may be readily deduced from it.

In order to demonstrate the truth of the first proposition, Dr Ferguson has recourse to facts of two orders; 1. those which show the vitiation of the blood by the artificial introduction of various substances into the blood-vessels; and, 2. those which show the vitiation of the blood from certain diseases, as scurvy, purpura, icterus, &c. To establish the truth of the first proposition, he examines the experiments of Gaspard and Cruveilhier, who, it is well known, injected purulent matter and various foreign substances into the veins, and the effects of which he endeavours to show were to produce either death or various inflammatory disorders, and occasionally depositions of purulent matter in different remote organs. From the experiments performed by these authors, without adopting their views, Dr Ferguson thinks himself entitled to infer, that there are two sources from which the blood may be vitiated, viz. either primary injection or absorption of deleterious substances; or direct injury of the solid coats of the veins, which, in consequence, are made to inflame and secrete a fluid or fluids, which, mingling with the torrent of the circulation, act as if they had been formerly injected.

Dr Ferguson further maintains that the term *phlebitis* is erroneously applied to the train of symptoms arising from mechanical injury done to a vein; because inflammation of the veins is not the essential, but merely the remote cause of this formidable distemper. A large space of a vein, he reminds the reader, may be obliterated by inflammation, while the symptoms vary greatly from those of puerperal fever; and in fatal cases of venous inflammation he tells us there is often no visible injury in the vein, and when visible it is confined to a few inches, or merely to half an inch. In confirmation of the same doctrine, that it is not the inflammation of the vein so much as the contamination of the blood, he appeals to the facts and arguments adduced by Mr Arnott in his paper on the secondary effects of *phlebitis*, and to the injections of various mechanical irritants, as practised by Gaspard and Cruveilhier, and concludes that even clots of blood left in the womb may act in the same manner, and produce, if not seasonably removed, the same contamination.

These views of Dr Ferguson we give much as they are stated by the author, without expressing any opinion whether they are well-founded or not. It must be admitted that they possess a certain degree of plausibility, and are entitled to attention from the pathological inquirer. It is impossible, nevertheless, to shut our eyes on the fact, that there is a certain degree of sophistry in the reasonings employed by the author, and that, while he studiously places in prominent relief all the facts and arguments which speak in favour of his own views, he overlooks entirely those which are opposed to these views. Without proposing to consider minutely all his arguments, let it merely be observed how he speaks of obliteration of a vein as an argument in favour of his hypothesis. This phenomenon he tells us, may take place for a large space in an important vein, and yet it does not produce symptoms of puerperal fever. This it was almost unnecessary to tell us; for it was a fact perfectly well known to pathologists. But there is another point, to which Dr Ferguson does not advert, and which shows that the two facts now stated,—the one of the obliteration of the vein, and the other of its not producing puerperal fever, must be viewed in a different light, and must furnish different conclusions from those which the author deduces. In the *first* place, the obliteration of the vein shows that this canal had been the seat of a different species of inflammation from that, which is most frequent in puerperal fever. Venous tissue, like most others, is liable to at least two sorts of inflammation, and perhaps that process may assume several other forms; but two at least are known to take place in it; the one, the mild and adhesive, sometimes without any morbid effusion, sometimes with effusion of lymph; the other, the suppurative, or that with effusion of purulent or sero-purulent matter. Now when the adhesive inflammation attacks a vein, and terminates in resolution, or causes effusion of lymph merely, it does not give rise to the frightful, the irritative, the enfeebling and exhausting train of symptoms observed in the suppurative form of the disorder. The adhesive inflammation is attended with symptomatic fever, but not with typhoid symptoms; with local pain, but not with the general diffuse swelling and tension of the limb observed in the other; and it terminates in causing the union of the opposite side of the vessel, after which in general the patient recovers. Compare with this the course, symptoms, and termination of suppurative inflammation of the vein. Intense fever rapidly advancing and increasing, burning thirst, jactitation, restlessness, sleeplessness, dingy countenance, overpowering debility, great tension and swelling of the parts covering the vein, flushing and colliquative sweats, with the fatal termination in a space of time varying from five to seven or eight days,—all betoken a malady of a very different character.

Dr Ferguson further tells us that venous inflammation does not produce symptoms of puerperal fever. While in this he is right, it is to be deplored that he gives information which cannot be denominated new. No correct pathological observer ever imagined or maintained that venous inflammation causes symptoms of puerperal fever. If the inflammation be adhesive, it causes the symptoms already specified; and if it be suppurative, it gives rise to the more serious and formidable train of symptoms above noticed. Venous inflammation is venous inflammation, and causes the symptoms of that disorder. Puerperal fever is puerperal fever, and both its symptoms and characters are different and peculiar to themselves. But it must be observed that inflammation of the veins of the womb may be associated with puerperal fever; and if it be so associated, it gives rise to symptoms which complicate and obscure those of puerperal fever.

Let it not be imagined that, in urging attention to these facts, we deny the influence of the secondary effects of venous inflammation, as demonstrated by Mr Arnott. It must not be forgotten that, in a great number of cases, the patient does not survive sufficiently long to allow the secondary effects to take place; and a considerable number are destroyed by the primary disease, and by the violence of the constitutional symptoms thereby induced. The great solution of the whole problem is found in the fact, that in all the fatal cases there are presented proofs of suppurative inflammation of the veins, while in all the favourable cases we have the strongest reason to believe that no venous inflammation takes place, or that, if it do take place, it assumes and observes the adhesive form.

The second proposition of Dr Ferguson is, that the causes vitiating the blood are particularly rife in the puerperal state. To establish the truth of this proposition the author refers chiefly to the state of the internal uterine surface, from the arteries and veins of which the placenta has been forcibly torn, and which, therefore, he conceives, are in the state of a large wound, or even the stump of a recently amputated limb. This idea is not new, and has been repeatedly brought before the profession of late years, especially since Dr Lee directed attention to the state of the uterine veins and sinuses. Even the fact of the inner surface of the womb being covered by a false membrane for some time after parturition, may be said to have been taught by that author, who, certainly, in his observations on the mechanism by which hemorrhage is suppressed after parturition, demonstrated the fact, that the orifices of the large veins are covered by valvular-shaped productions of coagulable lymph. Dr Ferguson has, nevertheless, the merit of confirming the correctness of these views, and adducing, especially from the lower animals, the fact of the inner uterine surface being exposed or denuded by the forcible detachment of the placenta.

His notions on this subject may be understood from the following extract.

> " The cause, therefore, of puerperal fevers is, I think, simply a vitiation of the blood, which cause is demonstrably sufficient to produce all their phenomena ; that phlebitis, or peritonitis, or metroperitonitis, are only secondary effects of this one cause. For if any one or more of these be assumed as constituting the essence of puerperal fever, abundant examples may be found of puerperal fever, in which the cause fixed on is absent. Thus, to the believers in the identity of peritonitis and puerperal fever, we can show puerperal fever with a perfectly healthy peritoneum. To those who insist on inflammation of the uterine veins, as constituting puerperal fever, we can show the genuine disease without this condition."—Pp. 80, 81.

The third proposition, that the various forms of puerperal fever depend on this one cause of vitiated blood, and are readily deducible from it, is regarded by Dr Ferguson as proved by the experiments of Gaspard and Cruveilhier, and the other arguments already adduced. Conceiving the vitiation of the blood to be a circumstance proved by the previous facts and arguments, he thinks that it follows as a necessary consequence, that the noxious matter has a tendency to diffuse itself over the system, and to give rise to the disease varying in character, in distant parts at the same time.

The mode in which this diffusion of noxious matter is accomplished is twofold, according to Dr Ferguson,—by the medium of the pulmonary venous capillaries, and by that of the hepatic vessels.

As an obvious difficulty is presented by this hypothesis, in the fact, that the disease is in different cases limited to different classes of vessels, Dr Ferguson, in order to explain the phenomena of its confinement to one or two points, has recourse to the law supposed to be established by Mr Arnott, that coagula are formed at certain points, to prevent inflammation from spreading, and thus to confine the morbid action within as narrow limits as possible. By this contrivance he explains the fact, that the lesions in puerperal fever are so often confined to the womb and its appendages, to the lower portion of the peritoneum and to the adjoining intestinal canal; " for," he adds, " we have seen that the point of departure for the noxious matter is in this disease from the veins of the uterus."

It is perhaps right that the author should here be allowed to state his mode of explanation in his own language.

" Looking at their innumerable open-mouthed orifices, bathed in secretions, which we know to be often offensive, and undergoing decomposition, the possibility of infection of the circulation must be admitted; as also that the nearest organs would be those in which the undiluted virulence of such infecting matter would expend itself. As for the attempt to trace the paths by which distant organs are affected, it is obvious that this could be done, were it possible to know which of the uterine veins became first infected, and along which of its branches the infecting matter passed into the circulation; or to ascertain the quantity and quality of the fluid absorbed. As, however, this cannot be done, we must be content with the same degree of knowledge which we possess with regard to the action of other poisons affecting the circulation. No one doubts that the effusions into the chest, abdomen, and cellular membrane, and the local inflammations which succeed the injection of the viper poison into the current of the blood, are caused by the bite of the animal, or by the insertion of the experimenter, although he may not be able to trace an unbroken track of disease between the point of inlet, and the disordered organ. In the one and the other case, we ought to be satisfied that the conditions capable of accounting for these effects are there, and that the difficulties arise, in the first place, out of these very conditions of anatomical structure, which are too minutely complicated for tracking every step of the march of disease, and in the second, from the state of the poison, which, varying in strength or quantity, may, by a varying dilution in the blood, produce every grade of disordered function, without disorder of structure. Thus, then, there is an accordance and a keeping between the strangeness of the phenomena of puerperal fever, and the intricacy of the conditions under which they arise, which affords a strong presumption in favour of the truth of the explanation offered.

" In conclusion, then, I deduce the first, or peritoneal form of puerperal fever, from the action of the poison being more or less confined to this membrane.

" The second form, or the gastro-enteric; from the action on the liver, the organ through which, as the experiments of Gaspard and Fontana, and the admission of all physiologists show, most poisons received into the system endeavour to escape. Whether the mucous membranes of the intestines are affected directly by the vitiated fluids, or secondarily through the acrid secretions of the liver, or in both ways as I believe; the group of symptoms constituting my second form of puerperal fever remains the same.

"The third, or nervous form, I conceive to result from an impression on the nervous centres, not necessarily inflammatory, though it sometimes leads to inflammation. John Hunter speaks of this condition of the nervous system, under the metaphorical expression of 'alarm.' The first impressions of the most virulent poisons are very commonly accompanied with panic and extreme agitations. Fontana found this to be the case with dogs, after inoculation with the viper poison. The symptoms produced by the poison of cholera, of small-pox, and of vegetable miasmata, are in a certain number of cases so characterised. The impression on the nervous system, which is transitory in other cases, and soon veiled by the specific symptoms of some organ or organs labouring under the attack, remains in this as the permanent feature of the disorder; but violent perturbations of the nerves are, under such circumstances, speedily fatal. Where death does not take place from nervous perturbation alone, the membranes of the brain, and the cerebral substance, are found altered by the same process as is seen in other parts.

The fourth, or complicated form, is the result of a poison not confined to certain structures, as the peritoneum or uterus, where its violence is pent up and exhausted, but diffused by the circulation over many organs, causing each to re-act after its own laws, and giving to the disease it produces a character of inextricable confusion, and almost hopeless fatality."—Pp. 81–86.

Such is the mode in which Dr Ferguson applies his hypothesis to explain the several varieties of puerperal fever, and to solve the great problem of its sometimes being a slight disorder, easily curable, and at other times a most severe, unmanageable, and speedily fatal distemper. After what we have already said, it is almost unnecessary to add any thing on the applicability of this hypothesis to the purpose; and, indeed, we are more desirous that our readers should themselves form an opinion upon the validity and applicability of the different parts of the hypothesis, than to submit our own views. At the same time, we must be permitted to say, that so many objections to the application of the law of which Dr Ferguson studies to avail himself are presented, that we candidly confess our inability to discover its utility, while we think it impossible not to recognize some inconsistency in adopting, so freely as the author wishes to do, the law of the attempt to confine the noxious matter within the narrowest possible limits. In the *first* place, if the law of limitation be really profitable for any thing, and if it be efficient in any case, how comes it that it fails in so many instances? The history of all epidemics of puerperal fever, and, above all, the recent researches on the morbid anatomy of the disorder, show most clearly that any attempts of this kind are either abortive, or, if successful in producing limitation, they do not succeed in preventing the fatal termination of the disorder. *Secondly*, the necessity of assuming this law in order to explain the phenomena of the different sorts of puerperal fever, seems, in our apprehension, rather at variance with the doctrine maintained by the author, and is more strongly in favour of that which he attempts to overthrow, namely, the influence of inflammation of the uterine veins. *Thirdly*, and lastly, when it is considered how many females recover from the puerperal state, without symptoms of puerperal fever, and how many even recover from attacks of puerperal fever, under different and opposite modes of treatment, it appears to us a violent assumption to maintain that the womb is, in all instances, the source of poisonous and noxious secretions, which eventually contaminate the whole mass of the blood. Such an hypothesis would render it impossible to effect a cure, and unreasonable and absurd to expect it.

Of the fourth chapter, it is merely requisite to say, that the author gives there a view of the opinions and doctrines maintained by different physicians on the nature of puerperal fever.

The subject of the treatment of the disorder occupies the largest proportion of the volume, and contains, besides the exposition of the therapeutic principles taught by Dr Ferguson, numerous cases illustrating various points, pathological and practical. Into the detailed consideration of this portion of the work, our limits do not allow us to enter; and we propose to confine our remarks to one or two of the leading points.

Dr Ferguson accommodates the treatment to the kind of fever. For the peritoneal form, he employs at first opiates and poultices; and, visiting the patient in four hours afterwards, repeats the opiate, (ten grains of Dover's powder,) and poultice; and, if amendment do not follow in the course of the second four hours, he recommends depletion. All this is simple enough. But it is in the anomalous and ataxic forms of the disorder that physicians are most perplexed. Of emetics, the author very justly observes that they are useless and improper in certain forms only, and efficient only when judiciously used. They have indeed been hitherto employed very indiscriminately, and with a sort of blind empiricism. He recommends them chiefly in the gastric, or the gastro-hepatic forms of the disorder. Purgatives he allows in most of the forms; but he thinks they are most indicated in the gastro-enteric form, where there is evidence of bilious disorder or hepatic congestion, and in the ataxic form. In all the varieties he combines and alternates them with mercurials, as calomel and the blue pill.

The constitutional influence of mercury he recommends strongly as a remedy, calculated to obviate the worst effects of the most noxious and speedily fatal forms of the disorder. Dr Ferguson, in recommending the use of this mineral, adopts, in a general manner, the opinions of Dr Farre, who, it is well known, ascribes, with many other physicians, to it the property of arresting morbid action, and preventing the formation of morbid products in various forms of inflammatory action. Dr Farre conceived mercury to be useful in puerperal peritonitis, but hurtful in the typhoid form of the disorder. Dr Ferguson uses it in all forms as a purge; and in the first form, the peritoneal, he thinks it of great benefit after blood-letting. In the gastro-enteric form, he advises its use to improve and alter the secretions, but not to induce ptyalism. In the ataxic form it is imprudent to use it in either mode. In the complicated form, where there is no violent purging, its efficacy is warmly eulogised. Calomel is the best form of the remedy; but it may be also administered in the shape of ointment.

The testimony of Dr Ferguson as to the utility of mercury is confirmed by that of Dr Copland, who, however, gave it in much larger doses, (10 to 20 grains,) combined with from 1 to 3 grains of opium, and sometimes with camphor. The success of this mode of medication, even in the most malignant forms of the disorder, appears to have been great, (p. 287.) Sir Benjamin Brodie recommends corrosive sublimate as a very excellent form when the disease is suspected to be associated with, or dependent on, *phlebitis.*

It is a curious and important fact, that the matron of the hospital found that in many of the females there treated, the effect of the hospital diet was very depressing; and, as she was aware that many of these people were in the habit of taking gin very freely, she administered this liquor to them in the form of caudle; and after this the epidemic underwent a remarkable diminution in intensity. (P. 168.)

From the foregoing sketch, our readers will be enabled to form a just idea of the present volume, and the doctrines therein promulgated. At the end are given copious tabular views of the cases, and also of Mr Arnott's paper on phlebitis. These tables, with the cases contained in the body of the work, constitute useful records of facts, and will enable any one who wishes to study the subject in detail to acquire much instructive information.

We are sorry to observe that the work is printed not in a very accurate manner. Cruveilhier is throughout Cruvelhier; Tonnellé is invariably written Tonellé; and in page 140, where the author wishes to quote a sentiment in the original, is found the following, *a l'insu du malade et du medecin*, instead of *a l'insçu.*

We must not conclude, however, without saying that the author has been at great pains to collect information on this disorder, and to arrive at useful conclusions in regard to its pathology and treatment. On this account, however we may differ from several of his views and reasonings, we recommend his work to the attentive perusal of the physician, the surgeon, and the obstetrical practitioner.

PART III.

MEDICAL INTELLIGENCE.

ANATOMY AND PHYSIOLOGY.

On the Respiratory Branchial Apparatus of the Human Embryo during the first three months of its growth. By M. Serres. (Compte Rendu des Séances de l'Academie des Sciences, 17 Juin 1839.)—M. Serres demonstrates in this paper that the fissures in the lateral parts of the neck of the embryo, which M. Rathkê discovered in 1825, and which the analogy of the lower animals led him to consider as the respiratory apparatus of the embryo, do not perform that function; but he proves satisfactorily, that this function is performed by a villous structure, which he has discovered traversing the thickness of the *decidua reflexa*, and hanging loose, floating, as it were in the fluid found between the *decidua vera* and *decidua reflexa*. To these villosities he has applied the term *branchial*, from the functions which he believes them to perform. He has arrived at this from numerous dissections, which he narrates at length.

The ovum enclosed in the double fold of the decidua has its whole surface covered with the vascular villosities of the chorion. The *decidua reflexa* is perforated by a multitude of apertures, which can be compared to nothing better than those of the cribriform plate of the ethmoid bone; and the vascular villosities traverse the entire thickness of the *decidua reflexa* by means of these apertures, and thus come into immediate contact with the fluid which is contained between the *decidua reflexa* and *vera*. Sometimes these apertures in the decidua are one or two millimetres in diameter, but are completely filled up by the little villous masses, and covered by a membrane much finer than the arachnoid, which hinders them from being unfolded; at other times this fine membrane is awanting, and the villosities float loose in the fluid.

When the embryo is still very small, these apertures in the *decidua reflexa* present more the appearance of small sinuses or canals, as the membrane is then of considerable thickness. As the ovum increases in size, however, a portion of the villosities of the chorion go to form the placenta, where the fœtal respiration is afterwards carried on; the sinuses become converted into simple apertures; and the two deciduae approximating, the branchial villosities become atrophied and disappear.

The branchial villosities never leave their respective sinuses or apertures; they are kept in their situation by an enlargement or inflated mass at their free extremity.

M. Serres attributes the occurrence of abortion to injury done to the branchial apparatus; as on examining the aborted ovum in many such cases, he has found atrophy of the decidua with disappearance of the fluid; inflammation of the internal surface, also attended with the disappearance of the fluid; and increased secretion giving rise to a kind of dropsy. But the far most common appearance presented was that of congestion of blood in the branchial villosities, and effusion of blood into their structure, similar to that met with in cerebral or pulmonary apoplexy.

"Such," says he, "is the respiratory branchial apparatus which we have discovered in man during the three first months of his fœtal existence."

MEDICAL PATHOLOGY.

Case of Coagulation of the Blood in the vessels during life.—(L'Experience, 25th July 1839.)—The subject of this case was a woman, 59 years of age, the mother of seven children, whose menstrual discharges stopped at the age of 48. From her 34th year she had been subject to epigastric pains, nausea, and vomiting, which usually continued for two months at a time. For the three last months the epigastric pains had returned with increased violence, accompanied by aggravated symptoms of dyspepsia, with much uneasiness and anxiety after taking food; and two months before her entry into the hospital, a tumour became developed in the middle of the abdomen.

On her admission to the hospital the following symptoms were remarked. Face pale, somewhat ash-coloured, and swollen; the legs were *slightly* œdematous, and presented marks of old varicose veins; the body was much reduced; the pulse was 120 in the minute, and tolerably strong; on the left arm the basilic vein was seen and felt as a hard resisting cord, which extended above the elbow-joint; on pressing this vessel it was felt to be filled with clots, which could be pushed from one part to another. The tongue was natural in colour and appearance; there was no thirst, the appetite still continued, and pressure on the epigastrium was not attended with pain. In the epigastric and right hypochondriac regions a large irregular tumour was felt, which appeared to be composed of a great number of pretty large agglomerated granulations. She was ordered to be bled in order to discover the cause of the distension of the vein. When the vein was opened, a solid grayish white, perfectly organized clot of an inch and a half in length was pressed out. On being closely questioned as to the period when she first observed the vein to become swollen and hard, she said, that, about a month before her entry into the hospital, she had felt some pain in the left arm, and at that time perceived the vein to be swollen, but that the limb never presented the slightest appearance of œdema or serous infiltration. The collateral veins appeared to be free of clots, at least they were not swollen.

The patient rapidly got worse; the abdomen became distended with serous fluid; the lower limbs likewise became œdematous, and in a few days afterwards the upper also. It was remarked, that the left hand was not involved in the œdematous swelling: but the basilic vein of that arm still continued filled with a clot, and was as large as the little-finger. She died fifteen days after her admission into the hospital.

The left basilic vein was carefully opened in its whole length, but no adhesion was discovered between the clot which filled it and the internal membrane of the vessel, which presented its normal texture, its serous coat being smooth and polished. At the upper part of the arm, near the axilla, the calibre of the vein was somewhat narrowed, and the fibrine at this point was of somewhat greater density than that enclosed in the rest of the vein. The whole clot consisted of fibrine strongly coloured by the red globules of the blood, its consistence being that of fibrine, and it could be lifted out as a solid cord from the vein which contained it. All the veins of the left arm, those of the inferior extremities, and of the feet, which were varicose, presented exactly the same appearance; all these vessels, whether superficial or deep, were filled with a dense, deeply coloured fibrous cord, which could be lifted out in a solid piece, and represented exactly the vessels and their divisions.

All these fibrous clots were composed of concentric fibrinous layers, intimately united together, and more coloured at the centre than at the circumference, forming a homogeneous cord, equally consistent throughout. In the left femoral vein, however, here and there were found portions softer than the rest, and of a wine-red colour, but the coats of the vein in contact with these portions did not present any particular alteration.

The *vena cava* and the aorta were filled with clotted blood; that of the aorta consisted of a dense resisting clot, much larger than what is usually found, and the aortic valves appeared to be on the point of undergoing the cartilaginous degeneration.

The hypertrophied liver presented on its convex surface rounded cancerous masses of about half an inch in breadth, and separated from one another by indurated portions of the parenchyma of the liver. The whole thickness of the liver was studded with these cancerous masses, which were not, however, hardened. A clot was found in one of the hepatic veins. The bile was of a deep-green colour. The pyloric orifice of the stomach had undergone the cancerous degeneration, and was softened at many points, and the different coats of the stomach were much diseased.

On the Disorders of the Brain connected with diseased Kidneys. By THOMAS ADDISON, M.D. (Guy's Hospital Reports, No. vi. April 1839.)—According to Dr Addison's experience, cerebral affections connected with renal disease are marked by a pale face, a quiet pulse, a contracted or undulated and obedient pupil, and the absence of paralysis.

He distinguishes five different forms of cerebral disorder. These are:

1. A more or less sudden attack of quiet stupor, which may be temporary and repeated; or permanent, ending in death. This form of cerebral disorder appears to be characterized by a mere torpidity of manner, sluggishness of intellect, and tendency to quiet stupor, and is met with of all degrees of severity up to its most exquisite form, when there is complete insensibility to all surrounding objects. There is, however, no paralysis, no laborious or stertorous breathing, and no convulsions; the face is pale, and the pulse quiet. This appears to be the least formidable variety of cerebral disorder attending renal disease, and is chiefly connected with temporary derangements of the functions of the kidneys. Thus it is not unfrequently observed at an early period in the progress of scarlatina, and in cases of fever, as also in retention of the urine from stricture or calculus. In such instances the symptoms pass away and the patient recovers.

2. A sudden attack of a peculiar modification of coma and stertor, which may be temporary or end in death. The first form of cerebral affection sometimes passes into this, which is the serous apoplexy of authors. The coma is for the most part complete, so that the patient cannot be roused to intelligence for a single moment. The stertor is peculiar, and in a measure characteristic of this form of cerebral disorder. It has not the harsh deep guttural sound of ordinary apoplexy, but has more of a hissing sound, as if produced by the air striking against the hard palate or the lips, rather than against the velum and throat. The act of respiration is in general more hurried than in ordinary apoplexy. The face is pale, often remarkably so; and this, combined with the peculiar hissing stertorous breathing, has often enabled Dr Addison to pronounce the comatose symptoms to be dependent on renal disease, without asking a single question.

3. A sudden attack of convulsions, which may be temporary, or terminate in death. The face is pale, though occasionally it is flushed at intervals. The pulse is singularly quiet, but during the convulsions becomes

rapid, irregular, and jerking. This form frequently passes into the next variety, which, in fact, is—

4. A combination of the two latter; consisting of a sudden attack of coma and stertor, accompanied by constant or intermitting convulsions. These two last forms of cerebral disorder indicate a more serious affection of the kidneys than the first variety. Dr Addison has observed them most frequently in cases of renal dropsy after scarlet fever; and in that form of dropsy supposed to arise from direct exposure to cold and damp, and known by the name of inflammatory dropsy. Still, patients often completely and permanently recover.

5. A state of dulness of intellect, sluggishness of manner, and drowsiness, often preceded by giddiness, dimness of vision, and pain in the head; proceeding either to coma alone, or to coma accompanied by convulsions. This form makes its approach in a more gradual and insidious manner than any of the other varieties of cerebral disorder which are connected with diseased kidneys. It is the most stubborn and intractable, as well as most fatal form, and is usually associated with that particular disorganization of the kidney described by Dr Bright.

On Paraplegia depending on Disease of the Ligaments of the Spine.— By C. Aston Key. (Guy's Hospital Reports, No. vi.)—As very few cases are on record where paraplegia has been traced to disease of the ligaments of the spinal column, unconnected with diseased bone, the following will be read with interest.

1. Samuel D——, aged 48, of strong frame and healthy appearance, was admitted into the hospital on the 21st October 1835. He had a stricture of the urethra, and a fistulous opening in the perineum. His urine, which was abundant and of natural appearance, chiefly passed through the perinæal aperture. About the 8th of November, he complained of being unwell, and on the 10th, he became suddenly delirious, attended with feverish symptoms. These symptoms abated under the use of sinapisms, opium, and ammonia, and counter-irritation to the back of the neck. He continued improving till the 28th, but was found to have nearly lost the power of motion in the right leg. Fever returned, with affection of the sensorium, and a very diminished secretion of urine; and he complained of severe pain across the upper region of the abdomen, extending into each loin, especially the left. In the second week of December, the left leg became paralytic, and he continued incapable of moving either, though he imperfectly retained sensation in both. On the 25th, he was attacked with diarrhœa, all his other symptoms became aggravated, and he died on the 3d of January, when the following appearances were found on dissection.

The viscera of the chest, and those of the abdomen, with the exception of the colon, were healthy. The colon was inflamed throughout its inner surface, a large portion of which had been removed by ulceration. Over the right kidney was a peritoneal cell, which contained feculent matter, opening into the colon. The rectum, near the anus, presented several extensive and recent ulcers. Both kidneys were injected with blood; and in one were two or three minute points of suppuration; their structure was firm. The bladder was much thickened. In the substance of the psoas muscle a large abscess had formed, extending from near the origin of the muscle to its insertion, and communicating with a collection of purulent matter in the hip-joint, the *ligamentum teres* of which, and part of the articular cartilages, were destroyed by ulceration. The head of the femur and acetabulum seemed to be expanded; and the neck of the former was surrounded with bony deposits of old formation. The vertebræ were free from ulceration. The bodies of the lumbar vertebræ were covered with irregular prominences of bones, and the intervertebral substances projected more than usual. Within the canal of the spinal column the ligaments covering the intervertebral substance between the second and third lumbar vertebræ were found hardened and prominent, and projected so far into the canal as to diminish it by one-third of its diameter; thus causing considerable pressure on the spinal marrow.

2. George Weeks, aged 40, rather tall, and of a healthy appearance, has been for some years employed in carrying out beer for a public-house, which has exposed him to long-continued and fatiguing exercise. His health has been, in general, good, but twelve months ago he experienced a feeling of weakness in the left knee, which soon extended to the foot, accompanied with numbness and a sensation of cold. The right leg became similarly affected in a week or two, and he suffered from catching pains in the hip-joint on motion. He was obliged to leave off work from the increasing weakness of his legs a few days ago. Two months ago, he first noticed a want of power in the *sphincter ani*, which had increased so much in a month that he could with difficulty retain his motions. From the same period giddiness supervened upon any exertion.

On the 6th of July 1836, the day of his admission to the hospital, he had almost entirely lost the power of motion in the lower extremities; and a sensation of tingling, numbness, and occasional pain, extended from the loins downwards; he was unable to empty his bladder, except in drops; and his command over the *sphincter ani* was very imperfect, his motions frequently passing involuntarily. He had no pain in his back, either on pressure or on motion; no pain in the head, only occasional giddiness. He had the free use of his arms, and his appetite was good, but his sexual passion was extinct.

His urine was strongly ammoniacal on the 25th July. Fœtid purulent matter flowed involuntarily from his bladder on the 6th August, and continued to come away at intervals, when he was raised to the erect posture, till his death; he had no command over his lower extremities, sphincter of the anus, or bladder. He died on the 22d August, when the following appearances were observed on dissection.

The brain was somewhat small, but appeared natural. The liver, spleen, and kidneys did not appear healthy. A few points of purulent deposit were found in the kidneys. The bladder and ureters were extensively coated with sloughy fibrinous adhesive layers, and their surfaces were bathed with a bloody purulent secretion.

The intervertebral substance, about the twelfth dorsal vertebra, with the ligament covering it, presented a slight ridge, projecting into the medullary canal, as if an ossification from the edge of one bone tended to unite with a similar growth from the opposite edge. This transverse ridge manifestly narrowed the canal, as was very evident on passing the finger from the wider to the contracted part. The arches of the vertebræ and the medulla having been removed, no very visible displacement of the bones was perceived; but on making a vertical section in the median plane the fore outline of the spinal canal looked at this place as if the under bone had receded, whilst the front view of the bodies of the vertebræ still offered an unbroken line. It now appeared that the adjoining edges of bone, as well as the intervertebral substance, projected into the canal, the prominence of the last being the most considerable. The medulla was carefully examined, but seemed quite sound.

A number of similar cases are narrated, all tending to prove that paraplegia may sometimes depend on thickening of the ligaments of the spinal column; and Mr Key is of opinion that "the ligaments are more frequently in fault than any of the structures of the spinal column, and that many of the cases of paralysis, whether temporary or permanent, and vaguely classed under functional derangements of the spinal cord, will be found, by dissection, to depend on an altered condition of these textures."

On the presence of a Serpent in the Stomach. By Dr Mandt of St Petersburgh. (Rust's Magazin für die Gesammte Heilkunde, 35. vol.)—Abraham Isajeff, a peasant, 36 years of age, fell asleep under a tree about midday on the 27th of July 1838. He awoke suddenly in great terror from feeling some cold body, like iced-water, passing from his mouth down his throat to his stomach. He had heard it said, that this was precisely the feeling, which a person who had swallowed a serpent during his sleep would experience, so he instantly applied his hands to his stomach, and distinctly recognized the simultaneous movements of a living animal. He experienced in that region a sensation of icy coldness and oppressive weight. He became so frightened that he had no power to move, and required to be assisted home, where his friends gave him a decoction of tobacco leaves, after which the movements in the stomach ceased.

Next morning, the 28th, the movements again commenced, and were felt over a considerable extent, and the sensation of weight and cold troubled him much. The decoction of tobacco was repeated, which made him vomit thrice, and stopped the movements in the stomach for the time. After this he took some brandy, which produced no change. About mid-day, however, violent movements, as of a body tumbling about, were felt in the stomach, when he procured a carriage and drove to Dr Selle.

Dr Selle examined carefully the epigastric region, both with his hand artificially cooled by ice, and also with the warm hand, and thought he could perceive a rounded body lifting the parietes of the abdomen and then receding suddenly. By means of the stethoscope a sound of something between a gurgling and a rasping was heard, which sound seemed produced by a body, at irregular intervals, rubbing against a tense surface. He was ordered a draught of infusion of senna with sulphate of magnesia, which produced copious evacuations by stool. The movements in the stomach ceased, but the sensation of icy coldness and of weight still continued.

The same symptoms were present on the 29th, 30th, and 31st, on which day Dr Mandt saw the patient, and, after a careful examination, thought he recognized a hard elongated body through the parietes of the abdomen. No sounds but the beating of the arteries were heard by means of the stethoscope. The patient, both on this and the previous day, thought he felt as if the animal were falling further down; and this day the coldness, weight, and hard body were felt rather below the situation of the umbilicus. Active purgatives, with occasional doses of castor oil, were continued all this time.

On the 1st August the body was felt in the hypogastric region, but it was not now felt moving. On the 2d, the sensation of icy coldness was gone, only that of weight remained, indicating the position of the foreign body. Calomel and jalap, with other drastic purgatives, together with injections were administered daily.

Nothing particular was noticed till the 10th, when between four and five in the morning he had three stools; along with the second of which, the tail of a serpent came away; and with the third, the rest of the animal. He was obliged to assist the passage of the body of the animal by drawing it out gently.

The pieces of the serpent when put together, showed the animal to have been rather more than a foot long; and it was entire, excepting the left jaw, and a small portion of the tail where it unites with the body. All its articulations were found broken. It was recognized as the common viper, *Vipera berus;* and a representation of the animal accompanies Dr Mandt's paper.

Remarks.—Many cases are on record of persons who have swallowed living animals, or the ova of some of the reptile tribe, which have been developed in the stomach, and lived there for a longer or shorter time. Thus we are told of snails, frogs, salamanders or water lizards, and serpents, having been swallowed; but in general these narrations rest on very insufficient evidence,—usually on the testimony of the person to whom the accident had occurred. This case appears to be one of the best authenticated which has been recorded, both from the circumstance of having been watched during its whole course by medical men, and the symptoms carefully noted, and also from the remains of the animal itself having been seen and handled by them.

On Poisoning by the Vapours of burning Charcoal and Coals. By GOLDING BIRD, M. D. (Guy's Hospital Reports, No. viii.)—Dr Bird considers it as doubtful, whether carbonic acid is the only deleterious agent produced during the combustion of carbonized substances. This appears to be countenanced by the fact mentioned by Sobernheim, that an apartment, in which individuals have been found asphyxiated, has been sprinkled with cream of lime, and cloths dipped in that fluid suspended in it, until every trace of carbonic acid has been absorbed; and yet persons, on entering such an apartment, have experienced the ordinary symptoms of poisoning by charcoal-vapour. Orfila ascertained that, from dimly burning charcoal, there was evolved carbonic acid, atmospheric air, nitrogen, and carburetted hydrogen; but when in a state of vivid combustion only carbonic acid, common air, and nitrogen. The late Dr Babington considered it probable, that the presence of carburetted hydrogen added greatly to the injurious effects of charcoal vapour, from the circumstance that the vapours arising from dimly burning charcoal are more injurious than those evolved during a state of brilliant combustion. Dr Bird, however, thinks otherwise, as carburetted hydrogen is often present in very large proportion, in the atmosphere of coal mines, and yet the miners do not suffer any injury from breathing it. If charcoal be consumed in a confined space, not only is the air of the apartment deteriorated by the addition of the carbonic acid, but also by its having lost a portion of its oxygen, that portion which has united to the carbon to form the carbonic acid. Hence the air contains a larger proportion of nitrogen, and less of oxygen than common air.

It has not been found that a very large per centage of carbonic acid is required to produce fatal asphyxia. Small quantities, though at first not productive of any unpleasant feelings in persons inhaling it, will nevertheless cause serious and even fatal results in a space of time varying from a few minutes to some hours; indeed, in many of the recorded cases of fatal asphyxia, the persons who first entered the room to remove the body have not experienced any bad effects from their exposure to the noxious atmosphere.

Dr Bird has recorded two instances of the alarming symptoms which may be produced from breathing an atmosphere vitiated by charcoal vapour. A gentleman retired to his study heated by one of Joyce's patent stoves. Within an hour he felt some pains in his head, accompanied by dizziness, which induced him to open the window, when these disagreeable sensations quickly vanished. He closed the window and again sat down to his studies; but, at the end of an hour, he felt so seriously indisposed that he was compelled to leave the apartment. He had intense pain of the head, with a sense of constriction around the temples and forehead, resembling that produced by a tightly bound cord; his pupils were widely dilated, and contracted but feebly under the stimulus of light; he had singing in his ears; his pulse was 120, feeble, but regular; his face was very pale, and his lips livid; his extremities were cold; his hands of a faint purple colour: his respiration was rather laborious, and irregular; and the prostration of strength was so great, that he was unable to maintain the erect posture. By the abstraction of blood, and the administration of stimulants he recovered.

The other was of a more alarming nature. The Church of Downham, Norfolk, was heated by two of Joyce's patent stoves. For two Sundays they were used without any injurious effects; but as they heated the church insufficiently, care was taken to make the stoves consume the charcoal as completely as possible. In the middle of the morning service, a lady feeling some oppression, requested that a window might be opened. Soon afterwards some charity children were taken out of the church on account of their becoming affected. Mrs O. was soon afterwards seized with headach and vertigo. Another lady was seized with similar symptoms, which she said she experienced on the two preceding Sundays. Immediately afterwards Mrs B. was carried out of the church quite helpless; and another young lady followed her. Miss W. experienced a sense of constriction across the throat and around the head. She endeavoured to leave the church, but found herself unable to maintain the erect position; she was therefore carried out, and was confined to her bed until the next day, with an intense throbbing headach. The clergyman, in consequence of these accidents, abruptly concluded the service. About seventy persons were more or less affected.

Two fatal cases of asphyxia produced by the inhalation of the noxious vapour evolved from burning charcoal are narrated.

James Trickey, aged 66, watchman and steeple-keeper of St Michael's Church, was placed in the church in charge of a stove heated by charcoal, one of Harper and Joyce's patent apparatus. He entered the church, the first night it was tried at 11 o'clock P. M. on the 17th November 1838; and the next morning was found dead, lying on his face, with his feet about three feet from the stove His head was lower than the rest of his body from the presence of a step elevating the trunk towards the stove. A considerable quantity of vomited food was found on the floor near his mouth. The church was so full of some vapour that the respirations of the persons who first entered in the morning were considerably affected.

The body was examined on the evening of the 18th. The countenance presented a remarkable appearance of placid and calm repose: the eyes were lustrous, and the pupils rather dilated.

Head.—On sawing through the calvarium, part of the membranes were lacerated, so that three or four ounces of bloody serum escaped. The vessels on the surface of the brain were gorged with blood. Considerable effusion of serum was found between the arachnoid and pia mater, as well as at the base of the brain; and on cutting into the substance of the brain, numerous bloody points presented themselves. The blood was florid in every part of the brain.

Chest.—The lungs were very dark, almost black, with the exception of the margins, which were red; the vessels were turgid with florid blood. The heart was healthy, and contained one or two small fibrinous clots. The trachea contained a quantity of frothy mucus; the lining membrane was injected, and of a bright red colour. The blood in the chest was fluid; that in the veins being of a very dark colour.

The abdominal viscera were healthy.

In order to ascertain the true cause of death in this case, the stove was charged with forty-nine pounds of charcoal, which were lighted, and the church shut up at 6 A. M. At 4 P. M. the doors were unlocked and the church entered. A very disagreeable sensation was experienced on entering the middle aisle, where the stove was placed, attended with difficulty of respiration. The air a few feet above the floor contained enough of carbonic acid gas to render lime-water rapidly milky. Just below the step, where the poor fellow's head had been found lying, so much of the acid gas was present, that perfectly limpid lime-water being poured into a saucer scarcely reached it before it became perfectly opaque. Dr Bird, who performed these experiments, was seized with palpitations of the heart, a sense of swimming in the head, of constriction across the temples, and an almost intolerable pain about the occiput; and he could scarcely maintain the erect position. One of the church wardens and the sexton were similarly affected. These results confirmed the opinion, that death was caused by the inhalation of carbonic acid gas.

George Bell, aged 38, on the 22d of November 1838, whilst clearing a lime-kiln, fell down insensible, after he had been about four minutes on the chalk, about two feet below the top of the kiln, and with his face downwards. His face was pale, his eyes glazed, and his pupils contracted. He was comatose, with stertorous breathing; his pulse was about 50 and feeble; and his skin was covered with perspiration. He was carried home in the erect posture, when violent tetanic spasms came on. Blood was drawn from the arm, blisters were applied, and stimulants administered. The spasms abated somewhat in severity, but the comatose state continued till the 25th, when he expired,—about eighty hours after his removal from the kiln.

His body was muscular, extremely rigid, and of a light purple colour posteriorly. Many small irregular purple blotches were on the anterior surface of the thighs, groins, and abdomen; and a few were on the chest and arms; the face was pale and the pupils dilated.

Head.—The vessels of the dura and pia mater as well as the sinuses were congested with blood. The basilar arteries and those of the corpus callosum were full of clotted blood. There was slight subarachnoid serous effusion; and about a drachm of fluid in the lateral ventricles. The cerebral substance presented many bloody points when cut into. About six drachms of serous effusion were found at the base of the brain.

Chest.—The lungs were slightly emphysematous, and scarcely at all collapsed. The mucous membrane at the bifurcation of the bronchi was slightly vascular, that of the larynx and trachea was natural. The mucous membrane of the pharynx was somewhat vascular. Some white froth was found in the trachea. The heart and pericardium were of a healthy appearance. The blood in the larger vessels was coagulated and of a dark colour.

Abdomen.—The mucous membrane of the cœcum was of a deep purple hue as if ecchymosed, and was of unusual thickness. The stomach, intestines, and other viscera were healthy.

Air taken from the mouth of this kiln was found to consist of carbonic acid 4, common air 67, and nitrogen 29 per cent.

Dr Bird then gives a very full account of the symptoms caused by the inhalation of charcoal vapour, of the external appearance of the body, and of the appearances found on dissection, deduced from the cases related by the various authors who have written on this subject. He has also added two tables containing most of the published cases; in one of which all the varied appearances of the corpse, and in the other the appearances on dissection are noted. It is worth while to notice shortly the appearances, which may be regarded as pathognomonic of this variety of asphyxia, in order to prevent its being confounded with other causes of death.

The body is almost invariably studded with spots of a bluish or reddish brown or violet colour. These are most numerous on the most depending parts of the body. The eyes retain their lustrous aspect; and the pupils are invariably found dilated. The features present an appearance of calm repose, even slight distortion being extremely unfrequent. No reliance can be placed on the rigidity or flexibility of the limbs, or the slow cooling of the body, or the bloated or pale appearance of the face. The above are the only constant appearances.

On dissection the blood-vessels and sinuses of the brain are invariably found turgid with blood; and serous effusion is met with beneath the arachnoid membrane, and within the ventricles of the brain. The blood may be florid or dark-coloured, fluid, or coagulated. Effusion of reddish serum into the pericardium and pleura is very frequent; but the lungs vary very much in appearance, having no fixed character. The left ventricle of the heart and the great blood-vessels are usually found empty. The mucous membrane of the larynx and trachea is often found reddened and covered with froth; sometimes, however, it is pale.

These are almost all the appearances which Dr Bird regards as strictly pathognomonic of asphyxia from charcoal vapour. Various other diseased appearances are occasionally met with, but not with sufficient frequency to allow of any reliance being placed on them.

Fatal Asphyxia from the Inhalation of Carburetted Hydrogen Gas. By Thomas P. Teale. (Guy's Hospital Reports, No. viii.)—A strong smell of gas was felt in the sleeping apartment and adjoining pantry of a house occupied by an old lady and her grand-daughter, on the 21st December 1838; and in the evening of the same day, when a young person entered the pantry with a lighted candle, an explosion took place. A person from the gas works being called, said there was no danger to be apprehended, as there appeared to be no further escape of gas; Mrs Black and Miss Welsh therefore retired to bed. Next morning the neighbours became alarmed from the inmates not stirring at the usual time, and broke open the door, when a strong smell of coal-gas was perceived. In the bed-room Mrs Black was found in bed as if asleep, lying on her right side; Miss Welsh was lying on her face. The bed-clothes were scarcely at all disturbed. The body of the old lady was cold and quite rigid; that of her grand-daughter was still warm, but gave not the slightest symptoms of vitality, and rigidity of the arms soon commenced.

The bodies were examined on the evening of the day on which they were discovered.

Miss Welsh, aged 22. The surface of the body was remarkably pale and bloodless, with the exception of mottled discolorations of a light florid colour on the back and neck. The features were placid; the lips and eyes moderately open; and the pupils somewhat dilated. There was neither tumidity nor discoloration about the face or throat. The body was quite rigid. There was no oozing of fluid from the mouth or nostrils.

There was no unusual congestion of blood in the membranes of the brain. The substance of the brain was firm, and the blood, which oozed from numerous points on its cut surface, was fluid, and of a rather florid hue. About an ounce and a half of transparent serous fluid was found in the lateral ventricles; none, however, was met with at the base of the brain; and only a small quantity in the spinal canal. The spinal marrow and its membranes were not more vascular than usual.

The whole tissues of the body presented a pallid, bloodless aspect, there being a remarkable absence of turgescence in the vessels of the integuments, heart, stomach, bowels, omentum, and mesentery. The blood was everywhere fluid, and somewhat between arterial and venous in colour. The lungs were less crepitant than usual from serous infiltration; the bronchial mucous membrane was reddened. The mucous membrane of the stomach was thickened, opaque, and easily detached; that of the small intestines was reddened and injected, and in some points minute ecchymosed spots were observed. The urinary bladder contained about half an ounce of opake whitish fluid. The other organs were natural.

rs Black, aged 69. The appearances observed on dissection in almost particular coincided with those mentioned above, excepting that there opious serous effusion on the surface of the brain; that the lateral es were empty; and that a gas was found distending the intestines, was composed of carbonic acid, carburetted hydrogen, and nitrogen. r Teale endeavours to account for the absence of all the usual morbid pearances met with in those who die of asphyxia, on the supposition that the carburetted hydrogen must have acted gradually from its being much diluted.

MEDICAL THERAPEUTICS AND MATERIA MEDICA.

On the employment of the Compound Mercurial Plaster for the prevention of pitting in Small-pox, by N. AUG. NONAT. (Gazette Medicale de Paris, 27 July 1839.)—The reputed power of the compound mercurial plaster (Emplastrum de Vigo cum mercurio) in preventing the formation of pits or cicatrices from the variolous eruption, induced M. Nonat to make trial of it in a number of small-pox cases, and the results were all highly satisfactory. Many experiments have been of late years made in France with this plaster. MM. Serres and Gariel, however, appear to have taken the lead on these investigations, and the results of their experience were published in the Archives Generales, Vol. viii. p. 468, in the year 1835.

The conclusion to which these investigators arrived was this, that in all the cases in which the compound mercurial plaster was applied to the surface of the skin when covered with the variolous eruption, it produced a kind of abortive action in the pustules, by which matter was prevented from forming, and consequently no scar or pit was left. It did not appear that the prevention of the formation of matter in the pustule or its absorption if present, was followed in any one case by disagreeable symptoms; on the contrary, the disease appeared to be rendered milder by the diminution of the number of pustules. M. Gariel goes so far as to say, that, if by the application of the plaster to the whole surface of the body, we could prevent the suppuration of all the pustules, he has no doubt the disease would be reduced to its most simple condition. His experiments, however, only show the advantage of this treatment when applied to the face.

In the first case related by M. Nonat, he applied as a means of comparison, on one thigh, the common diachylon plaster, on the other, the compound mercurial plaster, which last was also applied to the face. On the eleventh day of the disease both plasters were removed, when it was found that no change had been produced on the pustules by the diachylon plaster, as they presented precisely the same appearance as those on the parts of the body which had not been interfered with; whilst those under the mercurial plaster were converted into solid tubercles, the skin being of a natural colour, and neither swollen nor painful. From this date, the pustules modified by the mercurial plaster, became the seat of a furfuraceous desquamation, under which they gradually diminished, and left not the slightest trace of a cicatrix. The eruption in this case was confluent.

The next case is equally interesting. The patient was a woman 36 years of age, and the pustules were confluent on the face, and partly so on the body. On the first day of the pustular eruption, the compound mercurial plaster was applied to the face; on the second day to the right thigh; on the third day to the left fore-arm; and on the fifth day to the right fore-arm; and on the sixth day of the eruption to the back of the hands.

On the eighth day of the eruption the mercurial plaster was removed from the face, and the parts which it had covered were found to be neither swollen nor painful, the pustules were all converted into minute granules or tubercles, varying in size from the minutest point, which scarcely raised the cuticle, to nearly the size of a hemp-seed. No fluid of any kind existed in the tubercle which had been left; the base alone of each was slightly injected and reddened. On the nose and lips, with which the mercurial plaster had not been in immediate contact, the pustules had gone on to suppuration; the pustules over the rest of the body being only as yet filled with a transparent serous fluid.

On the tenth day, the plasters, which had been applied on the second and third days, were removed, and the pustules were found changed in the same manner as those of the face had been.

The plasters which had been applied on the fifth, sixth, and seventh days of the eruption, that is, after it had advanced to the state of vesicles or pustules, seemed to have little or no effect in preventing the suppurating process, only the pustules advanced rather more rapidly than those on the rest of the body.

From this it appears, that if the mercurial plaster be applied on the first, second, or third days of the eruption, it will cause their disappearance without suppuration; whilst if applied later in the disease, though it may hasten the process, it does not put a stop to it.

M. Nonat relates many similar cases which it seems unnecessary to specify, all tending to prove the *abortive power*, if it might be so termed, of the compound mercurial plaster. It is to be hoped that practitioners in this country will be induced to give a fair trial to this simple means of preventing those unseemly scars which disfigure the countenances of those who have been afflicted with small-pox.

On the employment of Gold Leaf for the prevention of pitting in small-pox. (Compte Rendu, &c. July 1 and 8, 1839.)—Baron Larrey communicated to the Academy an interesting notice of a practice which was prevalent amongst the Egyptians and Arabs, by which they prevented the unseemly scars produced on the exposed parts of the body by the suppurating of the small-pox pustules. The practice consisted in covering the exposed parts of the body, as the face, hands, and feet, with gold leaf, as soon as the eruption made its appearance.

M. Legrand bears testimony to the efficacy of the practice, having tried it in one case which he relates. The patient was a beautiful English girl, who had a copious eruption of confluent small-pox. On the first day of the eruption the whole of the face was covered with the gold leaves, which were made to adhere by means of gum-water. The application was renewed morning and evening so long as the suppurative fever continued; and when the cure was completed, not a pit or scar was left on the face where the gold leaf had been applied. The hands and the rest of the body which had not been thus protected were deeply marked with the scars of the pustules.

Baron Larrey says, that he has found nearly the same beneficial results to follow from the repeated anointing of the face of the person labouring under small-pox with almond oil; a practice which recommends itself from its cheapness and the facility of its application.

Nux Vomica, a cure for incontinence of Urine. (Gazette Medicale de Paris, April 14, 1838.)—Dr Cherchiare has treated two cases of incontinence of urine successfully with the extract of *nux vomica.* The first was that of a girl, 19 years of age, who from her infancy had passed her urine involuntarily every night in her sleep. She was ordered the third of a grain of the extract of *nux vomica* in pill three times a day, and in eight days the cure was complete.

The second case was that of a young married female whose urine flowed involuntarily day and night after her first delivery. As there was no fistulous opening to account for the involuntary discharge of urine, and it appeared to arise from weakness of the neck of the bladder, in consequence of contusion by the head of the child, the extract was administered in the same doses as in the preceding case, and in fifteen days the cure was complete.

Nitrate of Silver in Phlogosis of Mucous Membranes. (Journal des Connaissances Medicales Pratiques, May 1838.)—M. Boudin has extended the application of nitrate of silver to the cure of inflammations and ulcerations of the ileum, which constitute one of the most constant lesions in typhoid fevers. When diarrhœa is the principal symptom, he administers the nitrate in enema, in the dose of from two to eight grains dissolved in six ounces of distilled water; and when gastric symptoms predominate he gives it by the mouth in pills, in the dose of a fourth to half a grain; and when the whole gastro-intestinal mucous membrane appears phlogosed he combines the two modes of administration.

Case of Croup in a woman thirty years of age cured by the Nitrate of Silver. (Gazette Medicale de Paris, 29 Juin 1839.) —— Magery, 30 years of age, on the 30th September complained of slight uneasiness in the throat which got worse the following day. On the 4th October the pain of the throat was considerable, and the left tonsil was slightly swollen, and in one portion presented a small yellowish point. She had no cough or fever, and the sound of the voice was not changed.

On the 6th, the loss of voice was complete; but guttural whistling sounds were heard. The left tonsil presented on its inferior half a false yellowish coloured membrane, which seemed to extend towards the opening of the larynx. This membrane was with difficulty detached with the handle of a spoon, showing the portion from which it was detached to be red and bloody. The pain in the throat was very great, but there was not much fever. M. Bretonneau being consulted, advised the parts to be touched with a concentrated solution of the nitrate of silver. Four drachms of the nitrate of silver were, therefore, dissolved in twelve drachms of distilled water, and the inflamed parts were touched three times a day with it. After each application of the caustic, the patient complained of a sensation of burning heat in the throat; and, after repeated attempts at coughing, brought up some fragments of tough yellowish membranes.

On the 7th, the pulse was somewhat increased in frequency; the same whistling sounds were still emitted from the throat, and she complained of sharp pain chiefly in the left side of it. There was an abundant discharge from the pharynx of thick and coagulated mucous fluid, resembling false membranes, which had formed on the tonsil and anterior pillar of the pharynx. The expectoration was mucous, and mixed with shreds of false membrane. The solution of the nitrate was thrice applied during the day.

On the 8th, the voice was less stifled, and the whistling sounds were somewhat diminished. A considerable quantity of false membrane was brought up by the cough. The caustic solution was twice applied.

On the 9th, the voice was more natural and scarcely attended with any whistling sounds, and the back part of the throat and epiglottis was in part deprived of its covering of false membrane. Considerable quantities, however, of false membrane were coughed up during the night. The caustic solution was omitted this day.

On the 10th, it was found that many portions of false membrane had been coughed up since the day before; many of them blackened with the nitrate of silver. The caustic was applied this day, and again for the last time on the 11th, from which period convalescence rapidly advanced.

As the local application of the solution of the nitrate of silver for the cure of inflammatory affections of the larynx is almost unknown in this country, we shall mention M. Bretonneau's mode of applying it.

A fine piece of sponge, of a pyriform shape, and about the size of the thumb, is cleft crucially at its smaller extremity, in order that it be attached to the bent extremity of a piece whale-bone, which is to serve the purpose of a handle to it. The patient is seated on a chair with his face to the light, and the head is held back and supported by an assistant. The sponge is then dipped in the caustic solution, and the fluid is afterwards expressed so as merely to leave the sponge moistened with it. The tongue is then held down by means of a spoon or spatula in the left hand, and the sponge freely applied over all the inflamed parts of the pharynx. To apply the caustic solution to the larynx, the sponge is carried beyond the glottis, and by means of a sudden pressure on the base of the tongue a few drops are expelled from the sponge, which find their way down into the larynx. This is repeated again and again, varying the point on which the pressure is made, so as to ensure the caustic solution reaching all the affected parts. The caustic is applied three times a day till the inflammatory action begins to abate, when it is less frequently repeated, and the solution employed ought to be weaker.

Narcotine, a substitute for Quinine.—(Quarterly Journal of the Calcutta Medical and Physical Society, July 1838.)—Numerous experiments have of late been made in India with the view of ascertaining what substances of native growth could be substituted for the more expensive imported medicines. Of these, narcotine, as a substitute for quinine, has been submitted to extensive trials, and given the most satisfactory results. The narcotine was employed in the form of muriate, and administered in three grain doses; and a number of cases are related where, from two to four doses of the narcotine succeeded in curing agues, which had resisted quinine, arsenic, *Cæsalpinia Bonducella*, and other native remedies.

Dr Stewart of Calcutta, after enumerating a list of cures effected by this substance, thinks he is warranted in arriving at the following conclusions:

"The muriate of narcotine is a perfectly safe agent to any extent, and in large or small doses; that, as a substitute for quinine, it is unexceptionable, and possesses over the latter many attributes which render it both a safer and more generally useful remedy in all the fevers of Bengal.

"These are, 1. In small doses it proves antiperiodic, if given in the intermission some hours before the expected paroxysm.

"2. In ten grain doses it is powerfully and immediately calmant, sudorific, and antiperiodic.

"3. It does not in such doses accelerate the pulse nor exalt the sensibility of the nervous system; it does not interfere with the action of other medicines; it does not constipate; it never produces giddiness, headach, or disturbed viscera; it does not produce nor increase determination to any particular organ, or to any already diseased or irritable viscus.

"4. It promotes all the secretions, and seems to act equally and generally on the whole capillary system, without depressing the vital powers, which it rather sustains meanwhile.

"5. Its action is maintained by application to blistered surfaces."

Dr O'Shaughnessy observes, that "the muriate of narcotine possesses powerful febrifuge and antiperiodic properties, but it does not produce narcotism, does not constipate the bowels, and never produces in fever cases the distressing headach and restlessness which so commonly follow the administration of quinine, and so often render its use uncertain, if not absolutely dangerous. The narcotine, is moreover, proved to be a powerful sudorific, perhaps the only one with which we are acquainted, which acts without producing either nausea or excitement.

Dr O'Shaughnessy prepares the muriate of narcotine by the following process, which appears to be simple and economical, and, so far as we are aware, new.

" Take of Bengal opium, 2 lbs. alcohol, 20 lbs. Rub them well together in a large mortar, adding the spirit by degrees, until the opium is exhausted of its soluble parts. Decant the solution, and press the insoluble part. To the alcoholic solution add as much ammonia as renders the liquid slightly turbid. Distil from a common alembic, till 15 lbs. of the alcohol are recovered. Draw off the fluid in a still, and set it aside to cool. On cooling, it deposits a mass of coloured crystals, composed of narcotine, meconate of ammonia, and resin. Wash with water, which dissolves the meconate of ammonia; and then with one quart of water and one drachm of muriatic acid, which dissolves the narcotine, and leaves the resin;—filter. The solution, which is of a rosy colour, is to be evaporated to dryness. The muriate of narcotine thus prepared is a transparent resinous mass, of a rosy colour, brittle vitreous texture, very soluble in distilled water and spirits, and intensely bitter.

A beautifully crystalline muriate of narcotine may be prepared by precipitating the muriate thus made by ammonia, and dissolving the precipitate in boiling alcohol, from which the narcotine separates in fine crystals, as the solution cools. The crystallized narcotine, placed in a tube, and subjected to the influence of a stream of muriatic acid gas combines with the acid, while it retains its original crystalline form. But this process, though more elegant, is too expensive and elaborate for general use, and the non-crystalline muriate is just as valuable as the more beautiful product now described.

Substitute for Jalap.—(Quarterly Journal of the Calcutta Medical and Physical Society, July, 1838.)—The seeds of the *Ipomea cærulea,* the kaladana, or mirabai of the Indian bazars, one of the Convolvulaceæ, which grows abundantly in every hedge and jungle in Bengal, when reduced to powder, and given in doses of from twenty to thirty grains, purges freely, without griping, in from two to three hours. It has been extensively tried in the Native and Police Hospitals of Calcutta, and has been in every case found superior to jalap; inasmuch as it is nearly tasteless, and operates freely, without producing the griping which jalap almost invariably occasions.

SURGICAL PATHOLOGY AND SURGERY.

Section of the Muscles for the cure of lateral Curvature of the Spine. (Compte Rendu des Séances de l'Academie des Sciences. Juin 24, 1839.) —M. J. Guerin informs us that he has already operated, with success, on twelve cases of lateral curvature of the spine; the operation consisting in the division of certain muscles of the back and of the spinal column. The muscles which he has already cut across, are the *trapezius,* the *rhomboideus,* the *levator anguli scapulæ,* the *sacro-lumbalis,* the *longissimus dorsi,* the *spinalis dorsi,* and *transversalis colli.*

" I have been convinced for a long time past," says he, " that the greatest number of articular deformities arise from convulsive muscular contraction, depending on an affection of the brain, of the spinal marrow, or of the nerves themselves, which are distributed to the muscles. This opinion, therefore, led me naturally to the two following conclusions, viz. 1. That the different forms which each of the varieties of curvature are capable of assuming are the consequences of a retraction affecting this or that muscle; 2. That the active treatment of each of these should consist of section of the tendons or muscular fibres which were the cause of each particular variety of curvature.

"These theories were put to the test of experiment on patients of both sexes and of different ages; the youngest operated on being 13 years of age, and the oldest 22. The curvatures were all of the second and third degree, with twisting of the spinal column and proportional gibbosity. In some patients a single section of the retracted muscles sufficed to produce a cure; in others two or three sections were required. In all, however, immediately after the operation, a marked improvement in the appearance of the spinal column was produced. In one young man of 21 years of age, who had undergone eighteen months of mechanical treatment for the cure of the curvature of the spinal column, an immediate restoration to the normal straightness was effected by division of the *longissimus dorsi* and corresponding spinal muscles. In others, the cure was completed with the assistance of mechanical aid. In none of the twelve operations, which I have performed has there followed the slightest accident; there has been no hemorrhage, no pain, no fever; and in all, with the exception of one case, immediate reunion of the wounds took place without suppuration."

Successful Case of the formation of an Artificial Anus. By M. Amussat. (Compte rendu des Séances de l'Academie des Sciences, 17 Juin 1839.)—A woman, 48 years of age, had been long subject to obstinate attacks of constipation, preceded by bleedings from the rectum, and wandering pains in the pelvic and lumbar regions. At last the stoppage of the bowels became complete, and she applied for surgical aid. All kinds of purgatives and other means were used for twenty-four days, without affording the slightest relief. On examination, the rectum was found to be completely empty, and there evidently existed some obstacle to the passage of the feces, but its nature could not be ascertained. She likewise laboured under a slight affection of the uterus, polypous excrescences of the urethra, and an old crural hernia. The woman was willing to undergo any operation which might be suggested for her relief, and, after a long consultation, it was resolved to cut down upon the colon on the left side, reach it where it is uncovered by the peritoneum, and make an opening into it. The operation was performed in the following manner:—

About two finger-breadths above the crest of the ileum a transverse incision was made, which extended from the mass of the sacro-lumbalis muscle to nearly over the middle of the crest of the ileum; being about five finger-breadths in length. The superficial fascia, the *latissimus dorsi*, and the external oblique muscles were cut layer by layer in the same direction; then the internal oblique and transverse muscles, and a muscular artery, which was cut across, secured. The aponeurotic layer was then carefully divided, and the fatty cellular tissue which covers the great intestine was cautiously removed with a pair of bent scissors. Two threads were then passed through the coats of the intestine, in order to keep it in its place, and prevent its escape from the wound. The colon was easily recognized from its great distension; and its being unprovided at this part with a peritoneal coat, a trocar was therefore plunged into it, and when the stilet was withdrawn a quantity of gaseous and fluid feculent matters escaped. A probe-pointed bistoury was then passed alongside of the canula, and the wound enlarged in every direction, when a very great quantity of gaseous and feculent matters escaped. The patient experienced immediate relief. Two injections were given; one being thrown into the upper portion of the colon, and the other into the lower, and no less than three chamber-pots full of feculent matter were washed out. The opening of the intestine was then attached to the anterior part of the wound by four points of suture.

No bad consequences followed the operation, and no circumstances occurred which rendered doubtful, even for a moment, the success of the operation. No inflammation occurred around the margin of the wound, strict attention to cleanliness and frequent cataplasms preventing this complication.

Two days after this operation the crural hernia inflamed, but by active measures any danger from this was avoided.

Sixteen days after the operation she had perfectly recovered, and the feculent matters were discharged by the wound two or three times a-day.

On the Process of Reparation after simple Fracture of Bones. By BRANSBY B. COOPER. (Guy's Hospital Reports, No. vi.) Twenty-four hours after fracture of the bones, a large quantity of extravasated blood is found effused into the cellular membrane of the muscles, filling up the spaces between the fractured extremities of the bones, and occupying the openings into the cancellated structure of each fractured extremity. The periosteum in the neighbourhood of the seat of fracture is also infiltrated with blood and thickened; so that a general extravasation of blood, attended with tumefaction, is all that is to be observed as the immediate result of the injury.

The serous and red colouring matters of the blood now become absorbed, and shortly afterwards inflammatory action commences, which gives rise to the deposition of coagulable lymph. This adheres firmly not only to the periosteum, but also to the coagulum, which has now acquired a considerable increase in firmness, so as to produce a degree of stiffness of the limb which maintains the bone in a state of comparative rest. The effusion of lymph proceeds so as to fill the adjacent cellular membrane, to occupy the space between the separated fractured extremities of the bone, to thicken the periosteum, to fill up the interstices between the muscular fibres, and, in fact, to present so homogeneous a mass as to render it difficult to distinguish the various structures from each other. About this period the fractured extremities of the bones are found softened, granular, with their asperities partly removed, and firmly adhering to the surrounding lymph.

Blood-vessels now begin to be traced through the surrounding lymph, and an apparent anastomosis is established between the nutrient blood-vessels of the bone, those of the periosteum, and of the cellular membrane surrounding the lymph. A greater degree of firmness is also observed in the direction of the blood-vessels. This altered character of the effusion is most remarkable in the space between the fractured bones, where the lymph puts on the appearance of ligamentous bands more than that of cartilage. The whole mass, however, soon hardens and forms what is termed *callus.*

Contraction of the callus, apparently the result of interstitial absorption, now commences, and continues till it produces a perfect contact of the overlapping extremities of the bone. A distinct cellular membrane may be observed between the muscles, forming a complete membranous covering to the callus, and continuous with the periosteum of the shaft of each portion of bone to some extent beyond the seat of the fracture.

Between the bones the callus now puts on the appearance of true cartilage, and at the point of contact no appearance of periosteum can be discovered. This interosseous cartilage is next converted into bone. Several red spots or discs are observed scattered irregularly through it, and round each of these osseous matter is deposited, which gradually extends through the whole mass. The extremities of such portions of the shaft as overlap each other are now found to have lost the compact, and to have assumed a cancellated structure; so that if a longitudinal section be made through the fractured portions, the newly formed bone is found to be continuous with the cancellated structure of each portion of the fractured bone. The whole medium of union is at this period enclosed in one continuous investing membrane, but no medullary cavity is yet formed.

The bone now grows less vascular, and a modelling process is established, by which the size of the adventitious deposit becomes reduced. The asperities of the bone are rounded off, grooves are formed for the passage of tendons, blood-vessels, and nerves; and finally, the medullary cavity is restored, when the process of reparation may be regarded as completed.

New sign of Death by Hanging. By ALPH. DUVERGIE.—(*Annales d'Hygiene Publique*, January 1839.)—M. Duvergie proposes two additional tests, which he thinks will be of much service to the medical jurist in cases where there exists any dubiety as to whether a body found hanged has been so during life or after death. He has found in all cases of death by hanging "congestion of blood in the organs by which the generative act is accomplished," and "the existence of spermatic animalculæ in the urethral canal." The first of these has been frequently remarked before; but the last merits notice. He has been able to detect, with the aid of the microscope, spermatic animalculæ both in the semen which has been ejected upon the linen of the deceased, and also in the portions of that fluid still remaining within the canal of the urethra. He has even detected these animalculæ in seminal stains which had been on linen for no less a period than six months; but in this last case many of the animalculæ were found to have lost their tails, in consequence of the manipulations preparatory to their being subjected to the powers of the microscope.

He suggests the examination of spermatic stains by the microscope as a test of far greater value than any which chemistry is able to furnish. He advises that the fluid be pressed out from the urethra in preference to laying that canal open, as in this way the fallacy which might arise from the intermixture of any portions of blood is avoided. The fluid expressed is placed between two plates of glass and subjected to the microscope, when the spermatic animalculæ, if present, may at once be detected.

Exostosis of the Pelvis of unusually rapid Growth.—(*London Medical Gazette*, February 2, 1839.)—Mary Petit, thirty years of age, and of intemperate habits, observed, after unusual exertion, the veins of the right leg to be swollen; soon after which a small tumour of the size of a nut appeared in the situation of the femoral absorbent glands on the same side. This tumour gradually increased, became painful, especially on exertion, and she applied for admittance to St Bartholomew's Hospital on December 21, 1837, about six weeks after first noticing the swelling of the veins. At this time the veins of the right lower extremity were varicose in a slight degree, and there was a tumour in the bend of the thigh not larger than a pullet's egg. Being of an oval figure and slightly irregular on the surface, it was considered to be an enlargement of the femoral glands. It was free from redness and not painful on pressure; yet the patient complained of considerable pain in the part. The *Ung. Potassae Hydriodatis* was rubbed on the swelling. Shortly afterwards, from the increase of pain, leeches and a poultice were applied. The limb became œdematous on the first of January 1838, and the tumour so painful as to prevent rest at night. Four grains of the hydriodate of potash in decoction of sarsaparilla were ordered to be taken three times daily and a third of a grain of the muriate of morphine every night. On the 9th the limb was more swelled with increase of pain. The dose of morphine was increased to half a grain, and an opiate ointment rubbed over the swelling.

The tumour from this date increased rapidly, and became more painful. Having been at first movable like a glandular swelling, it became fixed, and extended along the inside of the thigh in the direction of the pubes and ischium, forming a large mass of a firm feel, not painful on pressure, filling up the space between the pelvis and the thigh. In the early part of April the growth was found to extend behind the abdominal muscles, towards the cavity of the pelvis. It continued to increase rapidly both on the outside and inside of that cavity, its growth being attended with general swelling of the limb.

On May 1st, the tumour, which was hard and incompressible, had stretched across the pelvis to the left side of the body, and the left leg began to swell. On the 17th May it had nearly reached the umbilicus. Her sufferings were constant and acute, and only imperfectly relieved by opiates. Her strength became exhausted; dyspnœa came on in June, and she lingered till the 1st of July, when she died.

The disease consisted of an enormous mass growing from both sides of the pubes and ischium, extending downwards to the groin and inside of the thigh, and upwards to the pelvis and abdomen. The viscera were displaced; the bladder and internal organs of generation being pushed towards the left side, whilst the abdominal contents were thrust upwards against the diaphragm. The basis and centre of the mass were firm bone, and the growth at its origin was identified with the bone from which it proceeded. The exterior was of softer composition, and displayed a fibrous texture more or less firm. On the surface this exhibited cells containing either serous fluid or grumous blood. No disease was observed in the absorbent glands. The thoracic viscera were healthy.

In its origin, and in the composition of its basis and interior, this tumour was an exostosis; in the rapidity of its growth, in the severe pain which accompanied it, and in constitution of its exterior, the characters were those of a malignant growth.

A Boneless Arm.—(*Boston Med. and Surg. Journ.* July 1838.)—The subject of this case was a Mr Brown, now in his 36th year, who in his 18th year fractured his humerus, near the middle; reunion was going on favourably, but was not completed when the patient had a second fall, and broke the bone again at the seat of the first fracture. The bone could not be made to unite again; on the contrary, to the surprise of the surgeon, the shaft of each part of the divided bone began to diminish in size and shorten in length. By a gradual action of the absorbents, the whole of the humerus was completely removed, and that too without any open ulcer, so that not a single vestige of it was left. It has now been in this state for many years, and probably will remain so for life, as there never will be again a deposition of bony matter in that place, nor even a cartilaginous or condensed ligamentous substance, which will materially change it from its present singular condition.

Mr Brown presents the spectacle of one short arm and one long one. The right fore-arm and hand are of a size to correspond to the sound one on the left side, and under certain circumstances equally strong. Ordinarily the right arm swings hither and thither, like a thong with a weight at the extremity; for the fore-arm and hand, with reference to the division above the elbow, constitute a pendulum oscillating according to the movements of the body. Although it is impossible to push with the defective arm, he can draw a bundle towards himself with it as strongly and tenaciously as with the other; and in so doing the muscles are elongated, so that the arm is extended to its original length. When the resistance is removed, the muscles instantly shorten themselves about six inches. To show the perfect non-resistance of the apparatus of muscles, arteries, veins, and nerves, in the soft boneless space, he can twist the palm of the hand twice round, which consequently presents the strange anomaly of having all the apparatus of the arm twisted like the strands of a rope. In that state the pulsation of the brachial artery and all its branches and ramifications could be felt under the finger, though passing in gyrations, like a winding staircase, twice round the soft unresisting fleshy mass.

OBSTETRICS.

New Test for the Detection of Pregnancy.—(L'Experience, July 25, 1839.)—M. Nauche found that the urine of pregnant women contains a particular substance, which, when the urine is allowed to stand, separates and forms a pellicle on the surface. M. Eguiser, from an extensive series of observations, has confirmed this fact, and found that the *kisteine*, as this particular substance has been called, is constantly formed on the surface of the urine of women in a state of pregnancy. .

The urine must be allowed to stand for from two to six days, when minute opaque bodies are observed to rise from the bottom to the surface of the fluid, where they gradually agglomerate and form a continuous layer over the surface. This layer is so consistent that it may be almost lifted off by raising it by one of its edges. This is the kisteine. It is whitish, opalescent, slightly granular, and can be compared to nothing better than to the fatty substance which swims on the surface of soups, after they have been allowed to cool. When examined by the microscope it has the aspect of a gelatinous mass, without determinate form; sometimes cubical shaped crystals are discovered on it, but this appearance is only observed when it has stood for a long time, and are to be regarded as foreign to it. The kisteine remains on the surface for several days; the urine then becomes turbid, and small opaque masses become detached from the kisteine, and fall to the bottom of the fluid; and the pellicle soon becomes destroyed.

The essential character of the urine of pregnancy, then, is the presence of kisteine; and the characters of the pellicle are so peculiar that it is impossible to mistake it for anything else. A pellicle sometimes forms on the surface of the urine of patients labouring under phthisis, abscess, or catarrh of the bladder, but may be easily distinguished by this circumstance, that it does not form in such a short time as the kisteine, and that, in place of disappearing, as this last, in a few days, it increases in thickness, and at last is converted into a mass of mouldiness. There exists, likewise, a very marked difference between its mucous aspect and that of kisteine—a difference which it is difficult to describe, but which is easily recognized.

Kisteine appears to exist in the urine from the first month of pregnancy till delivery. M. Rousseau has even recognized it in the urine of a few gravid animals.

TOXICOLOGY AND LEGAL MEDICINE.

Case of Poisoning with Digitalis. (L'Experience, 20th June 1839.)—A child 6 years of age, on the 24th October 1838, had an attack of what Dr Hirne, the medical attendant, calls measles, (rugeole,) but which from the attending sore throat (angine tonsillaire intense,) and consecutive anasarca appears to have been scarlatina. On the 11th of November, he was convalescent; but on the 15th, general anasarca came on, with the usual scanty urine. To relieve these symptoms, a mixture was ordered containing five grains of the powder of digitalis, which was to be taken in the course of the day; and as a liniment, one ounce of the tincture of digitalis, and the same quantity of that of squills. The mixture was given by injection, because the child refused to take it.

On the morning of the 16th, a drachm of the leaves of digitalis was infused in twelve ounces of water, and given by injection in three doses during the twenty-four hours. This brought on colicky pains, frequent stools, bilious vomitings, hiccup, faintings, and intermittent pulse. The symptoms continued with little change till the 22d, when the abdomen became tympanitic, and painful on the slightest pressure, the pulse still intermitting every twelve or fifteen beats, and the urine still continuing scanty, and the anasarca was increasing. The mixture containing the powder of digitalis was therefore resumed. There was no change for the better on the 23d or 24th, only the child passed a little water, but had several fits during the night threatening to carry it off Still the digitalis mixture was continued, though it constantly excited nausea and vomiting. Convulsions are first mentioned as having occurred on the 24th, and the child died on the 27th.

Dr Hirne attributes the death to the "extension of the serous effusion to the cranium, and its compressing the brain;" not believing it possible that such a small quantity of digitalis as two ounces of the tincture applied externally, with one drachm of the infusion of the leaves given by injection, and the five grain doses of the powdered leaves, could produce such serious symptoms as he had employed the same treatment in other cases with success!

We only take leave to remark, that for a child six years old, less than the one-half, aye, one-eighth of the quantity given would have been considered overdosing, and had death occurred with the above symptoms, it would have been attributed to the digitalis alone. Dr Hirne surely was not aware of the action of digitalis when he continued it after it had produced intermittent pulse, hiccup, vomiting, purging, and convulsions.

Cases of poisoning from the administration of the alcoholic extract of the Aconitum Napellus. (Journal de la Societé Royale de Medecine de Bordeaux, Juin 1839.)—A man, 45 years of age, was admitted into Hospice St Andre for a painful rheumatic affection, for the cure of which the alcoholic extract of the *Aconitum Napellus* was administered. He took two grains of the extract in the morning, and two in the evening, and by the end of the tenth day the pains were beginning to abate. Next day, however, his dose was taken from a new parcel of the extract, and a quarter of an hour after swallowing it, trembling of the muscles of the thigh, legs and arms, with darting pains came on, which, instead of diminishing, became more aggravated. These were rapidly followed by convulsions, which continued for a quarter of an hour at a time. Extreme heat of the mouth and throat were complained of, and he vomited whenever he attempted to swallow. During the convulsions the patient was insensible, but consciousness returned when they left him; the power of vision, however, returned but slowly. He complained of occasional severe lancinating or burning pain of the head, as if a bar of red-hot iron were passed through his brain.

Five hours after he swallowed the extract, in addition to the other symptoms, great anxiety, with hurried breathing, and irregular, soft, slow pulse came on, and the limbs were of an icy coldness. Great disorder of the movements and sounds of the heart were noticed. The bowels had not been moved. Heat was applied to the surface of the body, and a strong tincture of cantharides was rubbed over the spinal and precordial regions. A strong infusion of huaco was given, and a mixture containing ammonia was ordered to be given in repeated doses. The mixture was rejected, but the infusion of huaco remained on the stomach.

By the evening, the reaction was complete; the vomiting had not returned since he had taken the infusion of huaco. His recovery proceeded rapidly after this; and in little more than a month he was discharged from the hospital relieved of all his complaints.

A custom-house officer was admitted into the same hospital for the cure of rheumatic complaints of old standing. He had been much benefited by the use of the alcoholic extract of aconite, when one morning, immediately after the taking of his usual dose, he was seized with severe symptoms, which cut short his life after four hours of suffering. The chief symptoms noted were: an intolerable sensation of burning in the throat, vomiting, cold sweats, great anxiety, a kind of stoppage of the circulation, faintings, spasms, &c.

The extract given this day was not the same as that to which he had been accustomed, but was taken from a new pot. Two other patients in the same hospital were at the same time seized with similar symptoms, but recovered under the employment of strong infusions of coffee given internally, and the external application of heat.

The appearances observed on dissection in this case were the following: Venous congestion of the membranes of the brain, and numerous bloody points in the substance of that organ. The lungs were very much engorged with black blood, and scarcely at all crepitant. The left cavities of the heart were empty, but the right cavities were filled with thick blood, having very much the appearance of black currant jelly. The stomach presented a streaked appearance, and exhibited numerous brown patches, both more numerous and more distinct, the nearer they were situate to the œsophagus. The liver and spleen were very much gorged with black blood. The spinal marrow was not examined.

Survivorship after extensive Rupture of the Diaphragm. By Alfred S. Taylor (Guy's Hospital Reports, No. vii.)—E. L. aged 40, a sailor, was admitted into the hospital, March 7, 1838. His look healthy; his body spare; but his general health had been always pretty good. Six months previous to his admission, he had fallen on the deck of a vessel, from a great height, in consequence of which, his ankle was severely injured, and his ribs fractured. He suffered most from his ankle; a portion of bone had come away, and it had continued bad up to the present time. When examined, it was found to be in a sloughing state, and for this he was admitted. He did not complain of much pain; his appetite was good; and his bowels were regular.

After his admission, the state of his ankle became so much worse that amputation of the leg was deemed advisable. The operation was performed on the 2d of May, about two months after his admission. In spite of the greatest care, he gradually sank, and died on the 4th of June, after having been in the hospital about three months.

Subsequently to the operation, his chest was examined several times with the stethoscope, and the respiratory murmur was found rather deficient at the apices of both lungs; but still there was nothing remarkable in the sound of his voice, nor in the act of respiration before death. The chest on percussion gave out a good sound everywhere, except over the lower part of the left lung. The deceased stated that, many years ago, he had met with an accident by which he had fractured some of his ribs on the left side.

Sectio Cadaveris.—The cavity of the cranium presented nothing particular; there was serous effusion on the *pia mater*.

When the chest was opened, the heart was observed to be small, and to be situated rather to the right of the median line. The most remarkable and unexpected appearances were seen on the left side of the chest. The left lung, which was much contracted, lay superiorly, and behind. Its upper portion was pale, doughy, and crepitant; its middle portion, unusually divided from the rest, was pale, soft, and completely hepatized; inferiorly, this organ was of a dark-red colour, empty, and compressed. Two-thirds of this side, or nearly one-half of the whole cavity of the chest, was filled by the distended stomach, and a long curve of the arch of the colon. These parts had protruded through an aperture in the diaphragm; and were covered with a thin layer of omentum. It was found on further examination, that the opening, which was two inches and a half in extent, was situated in the muscular part of the diaphragm, anteriorly, and a little to the left of the œsophageal opening. The margin of the aperture, to which the omentum was in one or two places strongly adherent, was opaque, yellowish, firm, and even. The cardia was just within the opening, and the pylorus also, posteriorly. The ascending colon entered somewhat posteriorly towards the right side; whilst the descending colon ran out anteriorly. The bowel, in a contracted state, to the extent of about twelve inches, was folded vertically on the right end of the stomach, which was much distended with air. This organ contained some dark-coloured liquid; its surface was reddened, and a good deal softened. The fifth rib had been fractured near its middle, and the broken end had pierced the two layers of pleura. Patches of fibrine were found on the lung. The third rib had been fractured, and was much displaced. The fourth and sixth ribs had been simply broken, but had united. These injuries were evidently of old standing. The abdominal viscera presented no unusual appearances.

It would have been interesting to have known the history of this man more fully, in order to have ascertained whether those symptoms were present which are said constantly to attend this accident. Where rupture of the diaphragm has taken place, nausea, vomiting, greater or less difficulty of breathing, flattening of the abdomen, abnormal dilatation of the cavity of the chest, *risus sardonicus*, and a complete incapacity for muscular exertion, have been observed; and the sufferers have seldom survived long. None of these symptoms appear to have been present in this case, at least, during the period of his life when he was under the observation of Dr Taylor.

MISCELLANEOUS.

GRADUATIONS AND SURGICAL EXAMINATIONS.

Medical Graduations at Edinburgh.—On the 1st of August 1839, the Senatus Academicus of the University of Edinburgh conferred the degree of Doctor of Medicine on the following gentlemen, in number one hundred and nineteen, after having gone through the appointed examinations, and defended publicly their Inaugural Dissertations.

OF SCOTLAND.

Agnew Black Bogie, on the Formation and Properties of Pus.
Samuel Brown, on Carburets and their Crystallization, &c. On the Coagulation of Albumen, &c.
James Baillie, on Pneumonia.
Aw. W. Barclay, on Temperament.
John L. Campbell, on the Organ of Taste.
James Clerk, on Counter-irritants.
Patrick Cruickshank, on Vaccination as an Antivariolous Agent.
Joseph F. Casseau, on the Affections of the Spinal Column and its contained parts, their Anatomy, Pathology, and Treatment.
Thomas Cowan, on the different Methods of treating Arterial Hemorrhage.
Charles Douglas, on Phlebitis.
John Davidson, on the Physiology of Digestion.
John Foulis, on Hemorrhage.
James S. Oliphant Hossack, on Hydrocele.
Robert Jamieson, on the Pathology of Fever.
Thomas Kennedy, on Bronchitis.
David Kay, on the Pathology of Coma.
Alexander J. Low, on Neuralgia of the Face.
John Lumsdaine, on Malaria.
John G. Malcolmson, on Abscess of the Liver.
James Maxwell, on Yaws, and the influence which it has in originating Leprosy.
John Moodie, on Dysentery.

John Niven, on the Epidemic Fever of Edinburgh.
Jn. Pringle, on the Causes of Intermittent and Remittent Fevers.
Robert A. Ramsay, on Tetanus.
Francis T. Richardson, on the Physiology of the Heart and Circulating System.
William Robertson, on Enlargement of the Heart.
William Scott, on Aneurism.
Alexander L. Spence, on Gout.
William Scott, on Scarlatina.
William Symington, on Uterine Hemorrhage.
John Smith, on Hydrocele.
Walter Scott, on Dysentery.
John R. Traill, on the Functions of the Stomach and Intestines.
Js. M. Turnbull, on Animal Heat.
Thomas Graham Traquair, on Aphonia, or Loss of Voice.
Archibald White, on the Causes and Treatment of the various forms of Aneurism.
Alexander Wood, on the Nature and Causes of Dyspnœa and Asthma.
George Wilson, on the certain existence of Haloid Salts of the Electro-negative Metals in solution.
Alexander Young, on the Diseases and Accidents requiring the Operations of Tracheotomy and Laryngotomy.

FROM ENGLAND.

Ts. A. Ashcroft, on Animal Heat.
John Bagley, on Hooping-Cough.
John D. Brown, on Sea Sickness.
David Bowman, on Injuries of the Head.
James Brougham, on the appearances presented by the Tongue in Health and Disease.
Samuel B. Bucknill, on Apoplexy.
William S. Brown, on Tetanus.
Willoughby M. Burslem, on the Granular Degeneration of the Kidneys.
James E. Carrey, on the Ancient History of Opium.
Francis E. Chase, on the Light that has been thrown by Inoculation upon the Pathology and Treatment of Venereal Affections.
Charles H. Clarke, on the Connection between Body and Mind as applied to Disease.
James Crossfield, on Pericarditis, as connected with Acute Rheumatism.
William B. Carpenter, on the Physiological inferences to be deducted from the Structure of the Nervous System in the Invertebrated Classes.
Christopher M. Durrant, on the Physiology, Pathology, and Treatment of Asphyxia.
Hy. Downes, on Morbus Coxarius.
Thomas Davies, on the Causes of the Bellows Sound in Pericarditis and other Diseases of the Heart.
Charles Emmerson, on Enteritis.
Randle W. Falconer, on the Powers of some Umbelliferous Plants indigenous to Great Britain, especially Conium maculatum.
Charles F. Gifford, on Wounds of the Thorax.
William Gwynne, on Dislocation of the Hip-Joint.
Henry B. M. Harris, on Arsenic, in its Medical and Legal Relations.
W. C. Hancock, on Ophthalmia.
William B. Hender, on Acute Hydrocephalus.
Henry R. Madden, on the Species, Origin, and Chemical Properties of Sugar.
Ts. N. Meggison, on Hemorrhage.
John William Mudge, on Poisoning by Arsenic.
Frederick J. Mouat, on the Brain as the Organ of the Mind.
Robert Pearson, on Apoplexy.
William S. Rootes, on Poisoning by Arsenic.
Edw. R. Roberts, on Scarlet Fever.
John Summers, on Pneumonia.
D. E. Stodart, on Angina Pectoris.
John Shaw, on Animals furnishing Substances used in Medicine.
William Smiles, on Inflammation of the Veins.
James Sandys, on How far is the Function of Digestion dependent upon Nervous Influence.
William Strange, on the Nature of Vital and Physical Motions, and the Distinctions between the Laws that govern them.
Thomas Veitch, on Amputation, and

the advantages and disadvantages of Amputation by the Circular Incision and by the Double Flap Operation.
Joseph Williams, on the Anatomy, Physiology, and Pathology of the Ear.
Thomas L. Watkin, on Scirrho-Cancer of the Mamma.
Daniel Wane, on Tubercular Diseases of the Bones.
John F. D. Yonge, on Endocarditis.

FROM IRELAND.

Robert B. Colhoun, on Absorption.
Robert Clarke, on Organic Diseases of the Heart.
Edward R. Cardew, on the advantages and disadvantages of Amputation by the Circular and Flap.
Cornelius Denovan, on Pleurisy.
Wm. J. Dowlin, on Ophthalmia.
Arthur Fant, on Chlorosis.
Geo. G. Galbraith, on Suppuration.
James Going, on Hemorrhage.
Charles Hart, on Loose Cartilages in the Knee-Joint.
Pierce Hely, on Hysteria.
Charles Hurst, on the physical, chemical, and medical properties of Water.
Wm. Knox, on the relation between the Brain and the Mind.
William Major, on the treatment of Diabetes Mellitus.
George Muns, on Synochus.
William Philson, on Small-pox, Inoculation, and Vaccination.
Thomas M. Philson, on the Phenomena and Treatment of Croup.
Philip N. Walsh, on Variola.
John G. White, on Nephritis.
Joseph D. White, on Derangements of the Digestive Organs.

FROM ABROAD.

Henry Dacre, on the Dislocations of the Shoulder.
Alexander Gibb (Bengal), on Spasmodic Asthma.
George C. Hay, on Hydrocele.
Alexander J. Morrison, on Uterine Hemorrhage.
William S. Stiven, on the Pathology and Treatment of acute Rheumatism.
David Williamson, on Fractures.
Wm. A. Yates, on Pericarditis.
W. Stirling, on Diabetes Mellitus.
Theodore L. Godet, on Phthisis Pulmonalis.
Anthony J. Dolce, on Gunshot Fractures of the Femur.
Thomas B. Tytler, on Diseases of the Spine.
W. H. Fairbairn, on Hepatitis.
John Welsh, on Dysentery.
John B. Blyth, on the dependence of the animal and organic functions on nervous influence and its identity with Electricity.
Steph. D. Bramwell, on Frambœsia.
Charles C. Campbell, on Pathology of Spasm and Paralysis of the Glottis.
W. C. Seamen, on Injuries of the Urethra.
Arthur T. P. Cutting, on Angina Pectoris.
C. Corbin, on Catarrhal Affections.
Thomas Nurse, on Hepatitis.

Surgeons' Hall, Edinburgh, 1st September 1839.—Since 31st August 1838, the following Gentlemen have offered themselves as Candidates for the Diploma of the Royal College of Surgeons of Edinburgh, and, after producing satisfactory evidence that they had completed the course of study prescribed by the College, have been admitted to examination, and found fully qualified to practise the arts of Anatomy, Surgery, and Pharmacy, and have received Diplomas, as Licentiates of the College accordingly.

Scotland.

Angus, Forbes
Balfour, R. Anderson
Barclay, Charles
Barclay, John
Bogie, Agnew Black
Borthwick, Alexander
Brown, Alexander
Brown, Alexander
Buchanan, J. Gregory
Burn, John Scott
Campbell, John
Campbell, John Logan
Carmichael, W. Scott
Chapman, Edward
Clerk, James
Coltart, William
Cowan, George
Cowan, Thomas
Craig, William
Cruikshank, Patrick

Cumming, William
Davidson, David
Douglas, A. Halliday
Douglas, Charles
Dudgeon, Robert Ellis
Duncan, William
Fleming, Robert
Forrest, William
Fraser, R. Winchester
Fraser, William
Fulton, Allan
Fulton, Robert
Gillespie, William David
Graham, John
Gray, Arthur
Gunnyon, R. Halliday
Hamilton, Thomas
Hartman, Charles
Hosack, J. S. Oliphant
Inglis, James Gordon
Jamieson, Robert
Jolly, Alexander
Kennedy, Thomas
King, John
Laing, Francis
Laing, James
Lang, Thomas
Langlands, Robert
Lee, James
Lumsdaine, John
Macdonald, John Duff
M'Farlane John
M'Intyre, John
Mackenzie, James Greig
Mackenzie, William Ord
Maclagan, P. Whiteside
M'Lean, Donald John
Menzies, J. A. Robertson
Morier, John Francis
Moxey, James Todd
Murray, Thomas
Mushet, George
Naismith, John
Nelson, Thomas
Peter, James
Potter, James
Pottinger, Robert
Pringle, John
Pringle, William Spence
Ramsay, Robert Adair
Robertson, James
Robertson, William
Ross, James
Scott, Walter
Scott, William
Smith, John
Smith, William
Steele, James
Tait, John
Thomson, Alexander
Thomson, David
Thorburn, W. Crawford
Trail, John Robert
Walker, David
Woodcock, J. Ballantyne
Young, William Baker

England.

Aikenhead, John
Brown, John Dan
Browne, John Harris
Cameron, John
Currey, James Edmund
Damant, Thomas
Downes, Henry
Easton, G. Frederick
Ethrington, G. Francis
Henwood, J. Dimble
Hooker, Joseph Dalton
Hooper, H. Sutherland
Lilly, William Smith
Meggison, T. Nathame
Mudge, John William
Parker, Edward
Pigou, William Harry
Stirling, John
Stodart, David Edmund
Summers, John
Veitch, Thomas
Westmacott, Alfred

Ireland.

Cardew, E. Rotheram
Clarke, Joseph
Clarke, Robert
Donovan, Cornelius
Ekins, John Gartlan
Fant, Arthur
Galbraith, G. Thomas
Hart, Charles
Hume, G. Alexander
Kellet, Edward
M'Clelland, Joseph
M'Gawran, Peter
Mahood, George
O'Connell, Henry
Philson, Thomas Moore
Philson, William
Sheehan, James Patrick
Simpson, John
Toner, James
Walsh, Philip Nicholas

Abroad.

Allen, Thomas George
Black, Francis
Blyth, John Buddle
Campbell, Charles
Fairbairn, W. Home
Fearon, George
Fehrszen, Oloff Godlieb
Gibb, Alexander
M'Bean, John
Mackintosh, Robert
Mackintosh, W. Henry
Maclaverty, Alexander
Macrae, A. Charles
Moodie, John
Morton, George Edward
Playfair, George Ranken
Renouf, Charles Hugh
Scott, John
Stirling, William
Tytler, Thomas Bazett
Wetmore, T. Saunders
Williamson, David

Extracted from the Records of the Royal College by

Wm. Scott, *Sec.*

The seventh Anniversary of the Provincial Medical and Surgical Association was held at Liverpool on the 24th and 25th of July 1839, and was attended by a great number of most respectable members of the profession. Dr Barlow, after a short address, as retiring president, was followed by Dr Thomas Jeffreys, who, as president for the ensuing year, 1839-1840, delivered the address for the year. During the time of meeting, the attention of the Association was occupied with a number of very important subjects, in which the welfare and respectability of the profession are deeply interested. Among others, the method of parochial medical relief under the New Poor Law, which has been felt to operate most injuriously against the profession, and the question of a uniform system of professional instruction all over the empire, were the most conspicuous. Regarding the former, it was stated the system of obtaining medical assistance for the Unions by tender was to cease after the present year. As to the latter, it was finally agreed that a petition should be presented to Parliament, praying the members to take into consideration the best and most effectual means of rendering the method of medical education uniform over the whole empire, and at the same time communicating to all who shall give satisfactory proof of competent knowledge, the same rights and privileges in the exercise of their profession. On the evening of Wednesday, 24th July, Mr James of Exeter read a report on the progress of surgery since 1836, which occupied two hours. On the following day, Thursday 25th, after dinner at the Town-Hall, Dr Jeffreys, the chairman, presented to Dr Hastings, in the name of the Association, a portrait of that gentleman, who, as founder, has conferred services so substantial on the body. The portrait is deposited at the Medical Institution.

Monument to Sir William Franklin.—The Medical Officers of the Army will be gratified to learn that a monument has been erected in Rochester Cathedral, which is contiguous to the Military Hospital at Chatham, to the memory of the late Sir William Franklin, Principal Inspector-General of Army Hospitals, and that, near the same spot, monuments have been erected to the late Drs Blake and Forbes, Inspectors-General of Hospitals. The monument to Sir William Franklin has the following inscription:—

Gulielmi Franklin,
Equitis Aurati
Coll. apud Edinb. Regal. Medicorum
Necnon Chirurgorum
Socii,
M. D., S. R. S., E. S. H.
Princip. exercitus Britannici Medic. Inspectoris,
Hæc effigies memoriæ
Sacra.

Vitam quidem variis in orbis partibus Regis Patriæque
Servus degebat, medicus inter milites tam in belli
Congressu promptus, quam in valetudinario peritus
Postquam aliis domi foris que muneribus
Perfunctus erat, locum in medicorum
Concilio militari secundum gessit;
A quo
Tantum amicis sociisque boni
Protulit, quantum sibi
honoris Patriæque commodi.
Moribus integer, animo facilis urbanusque, veri atque
Justitiæ tenax, istos sibi amicos quamplurimos
Comparavit, qui uno animo mœrentes
Hoc marmor
Posuerunt.

Natus A. D. 1763. Mortem obiit A. D. 1833.

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